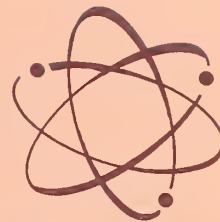




ARMY

RESEARCH AND DEVELOPMENT



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Army Picks 20 NSF-1 Winners For Summer Jobs in Labs; Girl Chosen for Japan Science Fair

The Nation's wealth of young scientific talent was pridefully represented by 420 contestants in the 15th National Science Fair-International at Baltimore, Md., May 4-9. The Army selected 20 of the most gifted students for laboratory summer jobs—one to attend the Japan Student Science Awards.

Nancy Lee Williamson, 17, Bryan (Ohio) High School, will go to Tokyo, Nov. 2-8, to represent the U.S. Army, along with the Air Force choice, H. Grady Rylander, III, 16, Austin (Tex.) High School, and the Navy award winner, Robert James Brock, 17, Arlington Heights H.S., Fort Worth, Tex.

Miss Williamson was one of six Army selectees among the 13 students who shared first-place awards in the all-around competition. Another was Toshiko Matsumaru, 17, Chiba, Japan, who became the first foreign girl to win one of the NSF-I top awards. Only one other foreign student, Gary Botting of Canada in 1960, has won a first award.

Miss Matsumaru developed a warm friendship last year with Rhea Keller
(Continued on page 2)

TARC Nears Climax of Research Study

The Army Research Council (TARC), a group of nine of the Army's top scientists, is nearing the climax of high pressure effort started in February to give the gimlet eye treatment to the most comprehensive study of Army research problems ever attempted.

Briefed on the progress of TARC at a Pentagon meeting May 15, Assistant Secretary of the Army (R&D) Willis M. Hawkins and Chief of Research and Development Lt Gen William W. Dick, Jr., indicated the completed study will furnish a firm framework to develop future programs.

Winston Churchill's classic phrase, "blood, sweat and tears," probably is as apt a description of the intensity of TARC effort in the past four months as might be conceived.

Enhanced by a continuing procession of eminent in-house scientific leaders in specific research areas, the Council has had daily (and more often than not far into the night) "hammer and tong" sessions to come to realistic grips with hard problems.

Discussions have been penetrating into every aspect of Army research, in an effort to arrive at well-defined objectives, procedures and concepts of distribution of essential resources—facilities, personnel and funding.

The report now in the final stages
(Continued on page 6)

Main Battle Tank Work Wins Maj Heiden Frank Pace Award

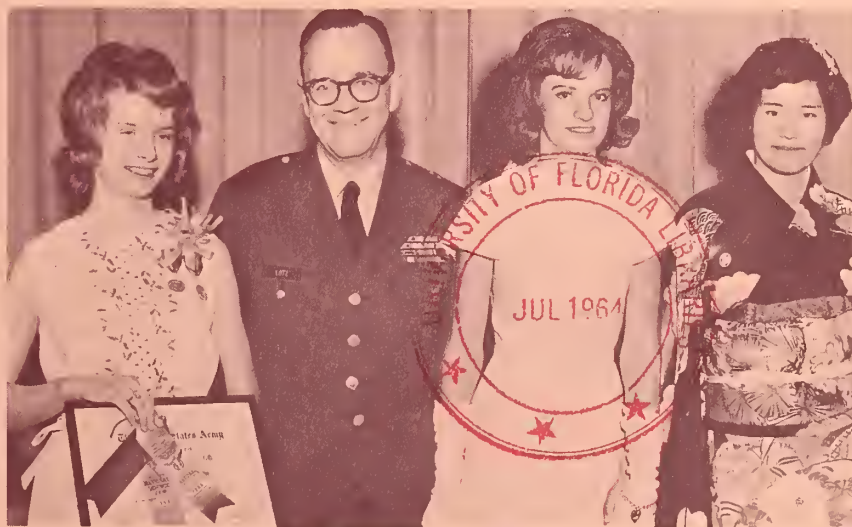
Secretary of the Army Stephen Ailes presented the Pace Awards on May 21 to Maj Charles K. Heiden, Office of the Chief of Research and Development (OCRD), and Miss Carolyn Vinci, Office, Comptroller of the Army.

Army research and development thus achieved top recognition for the second time since the awards were initiated in 1963 to honor Frank Pace, Jr., Secretary of the Army from 1950 to 1953. Lt Col C. J. LeVan, chief, OCRD Antiballistic Missile Office, and Joseph A. Beauregard, Office of the Chief Signal Officer, won the first awards.

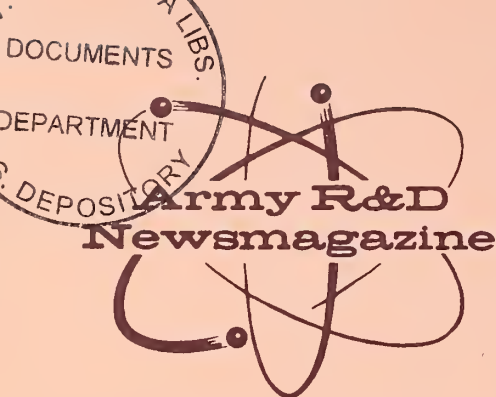
The Pace Awards are presented annually to one civilian employee of
(Continued on page 6)

Featured in This Issue . . .

Dr. Fubini Presents 3 Awards at Engineer R&D Laboratories	p. 3
Natick to Host Commanders, Technical Directors Conference	p. 3
ARO Colonels Hazeltine, Aines Take New Assignments	p. 5
Scientific & Technical Information Survey Nears Completion	p. 7
CDC Marks 2d Anniversary as Doctrine, Concepts Organization	p. 8
Armed Forces Industrial College Picks 4 in Army R&D	p. 11
USAR R&D Units Aid Junior Science Fairs Throughout U.S.	p. 12
Government Agencies Formulating Federal Meteorological Plan	p. 14
Studies Seek Increased Body Tolerance to Chemicals	p. 18
Watertown Arsenal Slated for Elimination in DoD Economy Move	p. 20
Second R&D Officer Wins General Marshall Award at CGSC	p. 21
Irradiated Foods Prove Acceptable in Series of Troop Tests	p. 28
Army Mapping Service Prepares for Astronauts' Moon Landing	p. 30
Army Medical Personnel Study High Altitude Troop Performance	p. 32
Eminent Scientists, R&D Leaders Contribute to NJSHS Success	p. 36



WINNER OF A TRIP TO JAPAN to represent U.S. Army at Student Science Fair Awards in Tokyo, Nov. 2-8, Nancy Lee Williamson poses with (left to right) Director of Army Research Brig Gen Walter E. Lotz, Jr., Rhea L. Keller, Army's 1963 Japan Fair trip winner, and Toshiko Matsumaru, who was chosen as the first foreign girl contestant ever to win an NSF-I first place award.



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Army Selects 20 NSF-International Winners

(Continued from page 1)

when Rhea attended the Japan Student Science Awards as the Army representative. Rhea came in for further NSF-I honors this year and was selected among 17 alternates for summer employment in or visits to the Army in-house laboratory having a primary interest in their talents.

Top honor recognition of Miss Williamson was based on her exhibit of a project titled "Immunological and Serological Studies of Plant Lectins as Related to Blood Grouping." Erik Olin Wright, 17, Lawrence (Kans.) H.S., was selected as her alternate for the Tokyo visit, based on an exhibit of "Analysis of the Total Number of Twists Resulting from Cutting any Order Mobius Band with any Number of Cuts."

Miss Williamson's scientific interests, which have won her science fair awards since 1960, have been developed without the influence of scientifically inclined parents. Her father is a farmer and bus driver; her mother, a sales clerk. Intent on a career as a medical technologist, Nancy expects that she will have to win a scholarship or earn enough to pay expenses. She is a member of the National Honor Society, has won various academic honors, and is a member of the Student Council. Hobbies include fine arts, sports and music.

Eric Olin Wright comes from a scientific family. His father, Dr. M. Erick Wright, is a psychology and psychiatry professor, and his mother has a Ph.D. degree as a psychologist. Erik has been winning science fair awards since 1958, has ambitions of becoming a research scientist, and has won various scholastic awards, including a National Merit award. His hobbies are music and photography.

Director of Army Research Brig Gen Walter E. Lotz, Jr., represented the Honorable Stephen Ailes, Secretary of the Army, and Chief of Staff General Earle G. Wheeler in presenting NSF-I awards to Army winners.

In addition to the Army awards, General Lotz presented awards to two students selected by the Army Aviation Association of America, consisting of a plaque and \$100 each (equivalent to the top prize at the NSF-I). Winners are Laidacker M. Seaberg, 17, Forest Park H.S., Beaumont, Tex., for "Design of Autogyros" and Richard Darrell Bennett, 17, Norte Del Rio H.S., North Sacramento, Calif., for "The Making of a Ramjet."

The Armed Forces Chemical Association made awards of a plaque and \$50 toward transportation expenses for summer jobs or visits to Army laboratories to Jim Lloyd Pickren, Paul Stephen Kaplan, Charles Griffith Taylor, Jr., Kathleen M. Thomas and Eileen M. O'Brien.

Army selectees among the 13 students who shared first place NSF-I awards are Charles Griffith Taylor, Jr., Eric O. Wright, Amory B. Lovins, Judith Herzfeld and Richard E. Albrecht. Other Army selectees were among second and third prize winners. The Air Force winner for the Japan Student Science Awards also was chosen by the Army for his project, "Simultaneous Oscillations in Negative Resistance Devices."

Most of the Army selectees have at least one parent who is a scientist, engineer or a teacher in the scientific and engineering fields; several come from homes where the father is an executive or businessman.

The father of Charles G. Taylor, for example, is a civil engineer, and the son also is planning a science career, backed to date by selection as

(Continued on page 4)

Natick to Host Conference Of Commanders, Tech Chiefs

The second annual Conference of Laboratory Commanders and Technical Directors, scheduled Aug. 3-4 at Natick, Mass., is expected to attract about 75 top leaders and scientists of Army research and development.

An invitation to hold the parley at the U.S. Army Natick Laboratories was extended through Assistant Secretary of the Army (R&D) Willis M. Hawkins and General Frank S. Besson, Jr., CG of the Army Materiel Command, approved the proposal just as the Newsmagazine was going to press.

Discussions will follow closely the pattern established at the introductory meeting a year ago at the U.S. Army Combat Developments Experimentation Center, Fort Ord, Calif., acclaimed as highly successful in promoting understanding of major program objectives and coordinated effort.

The Conference of Laboratory Commanders and Technical Directors is the successor to the Army Key Scientists meetings, which had been held semiannually for eight years until materiel functions of the Army Technical Services were merged in the new U.S. Army Materiel Command in August 1962.

AR 70-31 Sets S&TI Report Standards

One of the key policy documents pertaining to the Army's expanding scientific and technical information program is expected to be distributed to all Army research and development activities in the near future.

Army Regulation 70-31, "Uniform Standards for Technical Reporting," will require that all research, development, test and evaluation work conducted by Army components, contractors or grantees be documented in reports published within six months of completion of the project.

The Regulation provides a basis for developing an efficient, integrated technical report program. It stresses improved quality and utility of the reports, timely dissemination of desired information, and the development of automated techniques for effective interchange with other cognizant agencies throughout the Government and private industry.

Representative of many months of intensive high-level coordinated effort, AR 70-31 is precise in assignment of responsibilities and in outlining the general procedures to be followed in preparing technical reports.

The Director of Army Technical Information, Office of the Chief of Research and Development, is charged with responsibility to develop and recommend policy, procedures, and guidance governing technical reporting standards.

Commanders of the major Army commands will implement the provisions of AR 70-31, and may issue sup-

plemental instructions to cover unique problems requiring special treatment. The contracting officer will, in each instance, assure that reports requirements are incorporated into the contract.

Twenty copies of all technical reports will be sent to the Defense Documentation Center as part of the initial distribution. The DDC will provide for secondary distribution to industrial, educational and research organizations, and to the Department of Commerce, subject to security codes.

Unclassified technical reports whose contents require no special limitation on their distribution are automatically made available by the DDC to the Department of Commerce for sale to the general public through the Office of Technical Services (OTS). Such reports will not be distributed to foreign nationals except as provided by AR 380-19.

Dr. Fubini Presents 3 Awards at ERDL

Assistant Secretary of Defense (DDR&E) Dr. Eugene G. Fubini presented the Army Engineer R&D Laboratories commander's annual awards for achievement in science and technology at Fort Belvoir, Va., on May 18.

More than 200 coworkers and friends at the U.S. Army Mobility Command installation turned out to honor recipients at an awards banquet.

The Science Medal was presented to Solomon Goldfein, a supervisory engineer in the Materials Testing Laboratory and an employee at USAERDL since 1946. He was cited for research that has made it possible to predict the expected life of plastics, plastic-ceramic mixtures and metals at elevated temperatures.

Howard H. Mullins received the Technology Medal for his work on the Mobile Floating Assault Bridge/Ferry

An important provision of AR 70-31 is that technical reports will not contain material which may be construed as advertising or which implies that the Government endorses or favors any products, commodity, or service. Use of trade names will be kept to a minimum and reports necessarily containing them will be marked "For Official Use Only" and will not be distributed outside the United States Government.

Among other major provisions are those relating to proprietary information (as defined in ASPR 9-201(b)), copyrighted material, and patentable subject matter. In each case the procedure is designed to assure that the interests of the contractor or grantee and of the U.S. Government are protected.

AR 70-31 prescribes the format that will be standard for all technical reports prepared for the Department of the Army, and the general guidance as to how the contents are to be prepared.

(MFABF), a high priority project. Associated with the Laboratories since 1941, he is a supervisory bridge engineer. The citation commended his achievements in the concept, development, design, fabrication and test of the MFABF.

Col John H. Kerkering, Laboratories commander, presented the Leadership Medal to Ralph E. Armbruster, a supervisory general engineer in charge of the Producibility Section of the Production Engineering Branch. Employed at USAERDL since 1961, he was acclaimed for his success in implementing plans and programs that resulted in significant gains in efficiency.

Winners were selected from 13 nominees whose names and achievements were reported in the April 1964 edition of this publication.

USAEPG Appoints Directors Of Electromagnetic Testing

Ralph A. Byrd, has been appointed technical director of the Electromagnetic Compatibility Division of the Test Programs and Evaluation Department, U.S. Army Electronic Proving Ground, Fort Huachuca, Ariz.

Formerly with the Electromagnetic Laboratory at Redstone Arsenal, Ala., Byrd is a graduate of Wake Forest College, N.C., where he received his B.S. in mathematics. He has a master's degree in electrical engineering from the University of Maryland and has also completed studies toward a Ph. D. at the University of Alabama.

Before his employment at Redstone Arsenal, Byrd was chief of the Underwater Acoustics Branch, Naval Ordnance Laboratory, Silver Spring, Md. From 1953 to 1955 he served in the U.S. Army Signal Corps and received a reserve commission as a second lieutenant.



USAERDL COMMANDER'S AWARD WINNERS pose with Dr. Eugene G. Fubini (third from left), ASD (DDR&E), and Col J. H. Kerkering. Left to right are Solomon Goldfein, Howard H. Mullins and Ralph E. Armbruster.

Army Selects 20 Winners In National Science Fair

(Continued from page 2)

winner of numerous science awards and as president of the Georgia Junior Academy of Science, plus nomination to the U.S. Naval Academy.

Amory Bloch Lovins, a popular youth among the NSF-I contestants, might be said to have been influenced in his ambition to become a scientist by his father, an industrial scientist. His mother also has an M.S. degree. Amory has won awards in music as well as in science. His project, "A New Nuclear Magnetic Interaction," has a \$50 homemade heart that is said to out-perform complex \$20,000 commercial equipment.

Judith Herzfeld, a 16-year-old who has racked up some impressive science awards, is intending to become a chemist. Her mother is a teacher with an M.A. degree in Jamaica, N.Y. Judith wants research equipment and her "first wish" is for a centrifuge. Her project, "Spectropolarimetric Analysis of the Secondary Structure of Gramicidin-S and Tyrocidine-A," involves secondary chemical analysis of antibiotics.

Richard E. Albrecht's father is a chemical engineer and Richard is aiming to become a mechanical engineer, with talents indicated by his design and construction of a 8-inch reflecting telescope, including grinding and polishing the mirror. His project: "Atmospheric Refraction of the Low Sun."

John G. Cleland's "first wish" is for a computer. His project involved construction of a small computer using fluid controls and capable of handling two binary digits. His ambition is to become an aerospace physicist.

Only 15, Jim Lloyd Pickren has been winning science fair awards for three years for his research work with rats. His wish is for books of his own in the nuclear science field—so he can pursue his dream of becoming a nuclear scientist. His project, "Learning Ability of Four Rodents," was a study of the memory and discretion of rats.

Using mostly junk material, Thomas F. McGahee, 17, was a winner with his "X-Ray Power Supplies," which employs a home-built Tesla coil to power an X-ray machine. Now he would like a diffusion pump and a geiger counter for further studies toward a career as a science teacher.

Susan Carol Doherty, 17, has her sights set on a career as a physical chemist, and already has demonstrated her potential by winning a number of prizes in science fairs. Her NSF-I exhibit was on "Influence of the Bor-

Dr. Oesterling Heads Army NSF-I Judges Panel

Dr. J. Fred Oesterling, deputy scientific director for research, U.S. Army Natick (Mass.) Laboratories, chaired the 12-man panel of Army judges for the NSF-I.

Other members included Lt Col Timothy G. Barila, chief, Department of Resuscitation, Division of Surgery, and Lt Col William F. MacDonald, chief, Department of Experimental Surgery, Division of Clinical Surgery, Walter Reed Army Institute of Research, Washington, D.C.; Dr. Harold A. Zahl, director of Research, and Norman J. Field, deputy director, U.S. Army Electronics Laboratories, Fort Monmouth, N.J.;

Dr. Brennie E. Hackley, research organic chemist, and Dr. Charles C. Hassett, assistant chief, Physiological Division, U.S. Army Chemical R&D Laboratory, Edgewood Arsenal, Md.; Maj Alvin Hylton, research entomologist, U.S. Army Biological Laboratories, Fort Detrick, Md.; Dr. Henry P. Kalmus, chief scientist, Harry Diamond Laboratories, Washington, D.C.;

James E. Malcolm, OCE, Engineering MC-ED Washington, D.C.; 1st Lt Gerald R. Miller, Ph. D., NSF Post Doctoral Fellowship in physical chemistry, Nuclear Defense Laboratories, U.S. Army Chemical Center, Edgewood, Md.; and Lt Edwin H. Rogers, Ph. D., research mathematician, Computing Laboratory, Ballistic Research Laboratories, Aberdeen Proving Ground, Md.



Dr. J. Fred Oesterling

ate Ion on Crystals of Sodium Chlorate and Sodium Bromate Oriented in an Electric Field." John F. Doherty, her father, is a missile base construction engineer.

Linda Phyllis Wills, 17, won recognition for her work on "Electrical Conductivity in Malignant and Non-malignant Tissues," using a machine she devised to show that electrical resistance is lower in certain malignancies. Her father, Max B. Wills, is a doctor and Linda wants to be a psychologist.

With her heart set on becoming a science teacher, Kathleen M. Thomas, 17, has indicated her talents by winning science fair awards since 1960. Her father is a chemist. Kathleen also has won a number of scholarship awards and a citizenship award. Her work on "Metallic Diazotates Applied to Analytical Chemistry" shows methods of identifying organic compounds.

DNA studies, the fascinating field of trying to determine the chemical factors basic to the source of life and the differences in every human being, won honors for Eileen O'Brien, whose father is a college executive. Her project involved death or mutation in bacteria caused by changes in DNA affecting growth division and biochemical reactions from radiation.

Edward Jackson Pugh's goal is to become a geologist, an ambition that might be traced to his father's career as an oil broker. Both his parents are college graduates and his science interests began at an early age. He has been winning science fair awards since 1962. His NSF-I prize-winning

exhibit was, "Phenomena of the Fluvial Geomorphic Cycle."

Looking toward a career as a biologist, Paul Stephen Kaplan, 16, has been showing his research promise on studies of rodents. His NSF-I project, "Inducing Pregnancy by Artificial Insemination," involved the design and construction of electrical equipment for obtaining semen and artificially inseminating female C-57 mice. The technique provides greater control over special strains and prevents the spread of disease.

The future Mary Kristine Malins envisions is that of a medical doctor and she has shown research ability as a science fair awards winner since 1961. She also has won scholarship awards and is a member of the National Honor Society. Her exhibit: "Some Aspects of Marine Microbiology."

David Edward Kieras, 16, won his first science fair award six years ago and has been a consistent winner. Both of his parents have college degrees and David wants to be an electronics engineer. "A Machine which Duplicates the Learning Process," the exhibit which made him an NSF-I winner, required design and construction of a machine to show that the human mind makes use of factors analogued in the machine.

"Like father, like son" might apply in the case of Phillip P. Hughes, 17, who has ideas of being a nuclear physicist. His father is an electrical engineer. Phillip's award-winning exhibit in the field of plasma physics develops a method for generation of

electricity without moving parts by plasma action in a magnetic field over electrodes. The mock-up demonstrates the magnetohydrodynamic energy conversion principle.

The 20 students chosen for "Superior" awards, whose scientific interests and activities have been discussed, each will have a choice of summer vacation employment at an Army in-house laboratory or a one-week all-expense paid visit to an Army laboratory. Seventeen alternates also have been designated. Laboratories in which they will work are:

Chemical R&D Laboratories, Edgewood, Md. Charles G. Taylor, Glynn Academy, Brunswick, Ga.; James L. Pickren, Lewisville (Ark.) H.S.; and Kathleen M. Thomas, Cass Technical H.S., Detroit, Mich.

Biological Laboratories, Fort Detrick, Md. Eileen M. O'Brien, New Drop H.S., Staten Island, N.Y., and Paul S. Kaplan, Lebanon (Pa.) Senior H.S.

Ballistic Research Laboratories, Aberdeen Proving Ground, Md. Erik O. Wright, Lawrence (Kans.) H.S., and Phillip P. Hughes, Woodrow Wilson H.S., Beckley, W. Va.

Redstone (Ala.) Arsenal. John G. Cleland, Decatur (Ala.) H.S.

Walter Reed Army Institute of Research, Washington, D.C. Stephen H. Sinclair, N. Phoenix (Ariz.) H.S.

Rock Island (Ill.) Arsenal. Thomas M. McGahee, Central Catholic H.S., Lewisville, Ark.

Army Natick (Mass.) Laboratories. Linda Wills, Auburn (Ind.) H.S., and Mary K. Malins, Incarnate Word Academy, Corpus Christi, Tex.

Picatinny Arsenal Feltman Laboratories, Dover, N.J. Susan C. Doherty, Wichita (Kans.) H.S., and David E. Kieras, Central H.S., San Angelo, Tex.

Fitzsimons General Hospital, Nutrition Laboratories, Denver, Colo. Nancy Lee Williamson, Bryan (Ohio).

Waterways Experiment Station, Vicksburg, Miss. Edward L. Pugh, John Marshall H.S., Oklahoma City, Okla.

Electronics Laboratories, Fort Monmouth, N.J. H. Grady Rylander, III, Stephen Austin H.S., Austin, Tex.

Geodesy, Intelligence and Mapping R&D Agency (GIMRADA), Fort Belvoir, Va. Richard E. Albrecht, Parkersburg (W. Va.) H.S.

Harry Diamond Laboratories, Washington, D.C. Amory B. Lovins, Amherst (Mass.) Regional H.S., one-week all-expense-paid visit.

Army Materials Research Agency, Watertown, Mass. Judith Herzfeld,

Martin Van Buren H.S., Queens Village, N.Y., expense-paid visit.

Alternates named for the Army Meritorious Awards include:

David R. Meador, Jr., 17, Roanoke (Va.) Catholic H.S.; Jonathan R. Pawlik, 17, Dearborn (Mich.) H.S.; Tony M. Quisenberry, 17, Quanah (Tex.) H.S.; Gail B. Halpern, 17, Long Branch (N.J.) H.S.; David L. Abel, 17, Northwestern Senior H.S., Hyattsville, Md.; Alice Earlene Mitchell, 16, William Byrd H.S., Vinton, Va.; Dennis Lee Schatz, 17, George Washington H.S., Denver, Colo.; Louis H. Hardin, III, 17, Hillsboro H.S.;

Nashville, Tenn.; Leslie Everett Webb, III, 17, Falfurrias (Tex.) H.S.; Oliver Eugene Dial, Jr., 16, Castle Park H.S., Chula Vista, Calif.; Carin Catherine Clamann, 15, Incarnate Word H.S., San Antonio, Tex.; Carol A. Norcia, 17, St. Dominic Academy, Jersey City, N.J.; Spencer Woods Roedder, 16, Walter Johnson Senior H.S., Bethesda, Md.; William Gregory Mueller, 16, John Adams H.S., South Bend, Ind.; Donald Willis Tubbs, 16, North Thurston H.S., Lacey, Wash.; Rhea Louise Keller, 18, New Haven (Ind.) H.S.; Barbara Elaine Marzocchi, 17, Cumberland (R.I.) H.S.

Colonels Hazeltine, Aines Take New Assignments

Assistant Director of Army Research Col Charles B. Hazeltine, Jr., is slated to take over as deputy commander of the Berlin (Germany) Brigade in July and Director of Army Technical Information, Col Andrew A. Aines, will join the staff of the Defense Director of Technical Information, Office, Director of Defense (R&E).

Another key staff change moves Lt Col Wendell G. Van Auken about July 15 to relieve Lt Col Russell D. McGovern as executive to the Director of Army Research. Currently chief of the Special Activities Branch, USARO Scientific and Technical Information Division, Lt Col Van Auken has served in the Division since 1962. Lt Col McGovern is on orders for a unit command post with the Eighth U.S. Army in Korea.

COL HAZELTINE will go into an assignment for which he has been trained by a number of command jobs, including CO of the Combat Command "A" 2nd Armored Div., Fort Hood, Tex., until he reported to the Army Research Office in 1960. His first USARO post was chief of the Operations Research Division, and he advanced to his present job in 1962.

Graduated from the U.S. Military Academy in 1940 with a B.S. degree in military art and engineering, Col Hazeltine has completed the Command and General Staff College course at Fort Leavenworth, Kans., and the Naval War College at Newport, R.I. After serving as a Cavalry unit commander from 1940 to 1943, he finished out World War II as a staff officer in the G-3 section of U.S. Armed Forces in the China-Burma-India theater.

Among other key assignments, Col Hazeltine has served as a staff officer, Assistant Chief of Staff G-2, War Department; tactical officer, U.S. Military Academy; Army Member, Joint Advanced Study Committee, Office of

the Joint Chiefs of Staff; staff officer, Plans Division, Combat Developments, U.S. Continental Army Command.

COL AINES will be one of the aides of Walter M. Carlson, Defense Director of Technical Information, with whom his work has brought him into close contact for the past 17 months. The assignment is the second by name request Col Aines has had from the Office of the Defense Director of Research and Engineering in six years. He was called to ODDR&E in 1958 from the Combat Experimentation Center, Fort Ord, Calif.

Since reporting to USARO in September 1962, Col Aines has been termed the "architect" of the Army scientific and technical information program which has been adopted by the Department of Defense as a pattern for the other military services.

In his new assignment, he will serve as executive secretary, Committee on Scientific and Technical Information (COSATI) and will have other key staff responsibilities, the full nature of which will be announced later.

Graduated from Boston University with a B.B.A. degree in 1937, Col Aines earned a University of Maryland M.S. degree in experimental psychology (1951) and from George Washington University received an M.A. in international affairs (1961).

Col Aines has completed the Quartermaster School Advanced Course (1952), the Command and General Staff College (1953), the Armed Forces non-residence course in emergency management of the economy at the Industrial College of the Armed Forces (1956), and the U.S. Army War College (1960). He is a member of the American Psychological Association and the American Association for the Advancement of Science.

Main Battle Tank Work Wins Maj Heiden Pace Award



Maj Charles Heiden receives congratulations from former Secretary of the Army Frank Pace, while Mrs. Heiden, Secretary of the Army Stephen Ailes and young Charles Heiden observe during Pace Awards ceremonies at the Pentagon.

(Continued from page 1)

the Department of the Army in grade GS-14 or below and one officer (lieutenant colonel or below) for individual achievement of outstanding significance during the previous calendar year. Emphasis is on technological or military development requiring executive and scientific abilities.

Maj Heiden exercises OCRD general staff supervision over the combat vehicle portion of the Army R&D program, including weapons systems, propulsion systems, power converters, suspension systems and other components.

Recognition for the Pace Award was based on his achievements in planning, negotiating and preparing an agreement signed Aug. 1, 1963 between the United States and the Federal Republic of Germany (FRG) for joint development of a main battle tank for U.S. and FRG forces.

Being supported at close to \$10 million annually in FY 1964 and FY 1965, the main battle tank is expected to be the main Army ground combat weapon of the 1970s. It is being developed to weigh less, incorporate greater firepower with a higher first-round hit probability than the M-60 tank, and provide substantially improved cross-country capabilities. Involved is a \$100 million program over about a 10-year period.

The award citation recognized Maj Heiden for important contributions to drafting the agreement and the ground rules for initial formal negotiations with the Federal Republic of Germany, leading to adoption by NATO of the general characteristics of the main battle tank concepts as compatible with operational needs.

Since the agreement was signed Maj Heiden has continued to work, with notable success, on proprietary rights problems, management organization, and coordination of major items discussed at management board meetings.

The joint main battle tank program has been termed the first major development program undertaken by the U.S. in coordination with a Free World ally. The program could set the pattern for other joint development efforts in major weapons.

A 1949 graduate of the U.S. Military Academy, Maj Heiden received an M.S. degree in mechanical engineering from the University of Michigan (1957). He has completed courses at the Ground General School at Fort Riley, Kans., the Armor School, Fort Knox, Ky., and the Command and General Staff College, Fort Leavenworth, Kans.

Prior to his appointment to the Academy, he served in the Army as



Carolyn Vinci

an enlisted man (1943-45). He was platoon leader, troop commander, and a squadron maintenance officer with the 45th Mechanized Cavalry Squadron (1950-53).

Assigned to the U.S. Army Armor School, Fort Knox, Ky., as an auto repair instructor (1954), he served at Hq, USCONARC, Fort Monroe, Va., as R&D coordinator (1957-60), and with the 2nd Battalion, 40th Armor, 7th Infantry Division, Korea (1960-61) as company commander and battalion maintenance officer.

MISS VINCI is a GS-13 developments evaluation analyst with more than 24 years Government service. She was selected as recipient of the Pace Award for her outstanding ability and devotion to responsibilities in accomplishment of three projects of outstanding value to the Army.

In developing a forecasting system for expenditures and collections within the 11 separate and distinct Army appropriations, she gathered budgeting data from various sources and, through complex mathematical computations requiring extreme detail and effort in extrapolation, developed experience factors that can be applied to current accounts.

The factors result in a more accurate forecast of the expenditures and collections to be expected in the budget activity accounts within every Army appropriation.

Miss Vinci also is credited with writing a significant portion of AR 37-109 pertaining to the reporting and projection of the current International Balance of Payments (IBP) impact on budgetary activities, and in preparing the IBP annex to the Army FY 1965 budget submission.

Army Research Council Nears Study Completion

(Continued from page 1)

of preparation probably will have a profound impact on Army research during the next five years.

As this publication went to press, TARC members were hard at work to reduce the report from the 2,000-page first draft to about one-third or possibly one-fourth that size. The expectation was that the report would be ready for submission in final form about the end of June.

Established by direction of ASA (R&D) Hawkins, following a report by a special Ad Hoc Group of the Army Scientific Panel, TARC is chaired by Dr. Ralph G. H. Siu. Director of Army Research Brig Gen Walter E. Lotz, Jr., is coordinator of the planning effort.

S&TI On-Site Survey Nears Completion

The data collection phase of the On-Site Survey of U.S. Army Scientific and Technical Information Program activities was, at press time, nearing its May 29 completion deadline.

An 86-page coded and segmented questionnaire was used by interview teams to gather data in every Army facility in the continental U.S. Data is being processed to prepare break-out summaries of sources of funds, personnel, equipment, scientific disciplines involved, organizational elements, information holdings, users, functions and commands related to the handling of scientific and technical information.

Conducting the survey under U.S. Army contract is CEIR, Inc., of Alexandria, Va. The firm will process the data in a final report of approximately 1,500 pages. Specific information not included in the report will be stored for reference in a massive scientific and technical information data bank.

During the month of March, 110 Army personnel were trained as Scientific and Technical Information On-Site Survey interviewers in three one-week classes at CEIR.

Department of Defense personnel delivering talks at the classes included Defense Director of Technical Information Walter Carlson, Col Andrew A. Aines, director of Army Technical Information, and his deputy, Peppino N. Vlnnes, Martin H. Weik, Jr., project officer for the On-Site Survey, and Henry Jeffers of the U.S. Army Research Office Scientific and Technical Information Division.

The Army interviewers then began the job of obtaining the most comprehensive picture possible of Army scientific and technical information handling activities.

Some of the specific questions were:

- What is the total floor space used in performing scientific and technical information activities in this organizational element?
- What is the civilian and military strength of the organizational element handling scientific and technical information?
- What scientific and technical holdings does the element have?
- What activities are your staff trained and equipped to perform but do not perform at present?
- Are there organizations, committees, or groups outside of your chain of command with whom you must consult or coordinate on all or any part of your scientific and technical information activities?

• If this organizational element is capable of becoming the nucleus of a Technical Information Center, what specialties would be involved?

• Does this organization hold or sponsor formal, documented symposia or seminars for the purpose of exchanging scientific and technical information on research, development test and evaluation?

• How are distribution lists determined for technical documents?

• What percentage of library holdings are scientific and technical information?

The On-Site Survey is a step toward implementation of the Army Technical Information Program.

A primary goal is the establishment of an Army-wide, centrally coordinated and decentrally operated Scientific and Technical Information network as an integral part of the national scientific effort.

In 1962, the Chief of Research and Development convened a Lead-Time Reduction Symposium. A direct result was the establishment of an Army

Ad Hoc Group on Scientific and Technical Information.

Convened in October 1962, the Group conducted an intensive study and made 105 recommendations later incorporated in the Army Scientific and Technical Information Program.

A Department of Defense memorandum in October 1962 directed the Secretaries of the Military Departments "as a matter of priority" to complete an inventory and analysis of their scientific and technical information activities.

A survey of the funding of Scientific and Technical Information functions and activities at approximately 90 Army installations was made in November 1962.

From a careful analysis of the reports submitted, it was concluded that a comprehensive on-site survey was required to identify scientific and technical information functions and activities to determine existing personnel, equipment and facility resources as the basis for action to develop more effective capabilities for processing, storing, retrieving and disseminating technical information.

Ft. Huachuca Element Calibrates Precision Equipment

One of the most essential facilities to the U.S. Army Electronic Proving Ground at Fort Huachuca, Ariz., is the Standards and Calibration Laboratory, responsible for insuring the calibration and precision of every device used at the USAEPG to measure or test Army equipment.

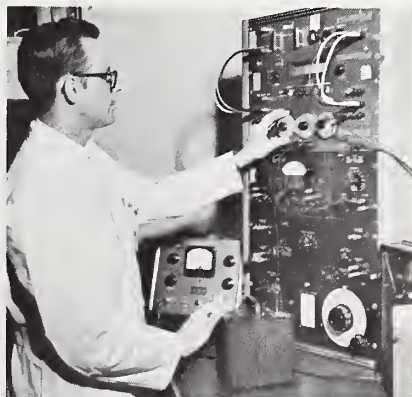
Working in conjunction with the U.S. Bureau of Standards, the Lab has a capability of determining the efficiency of test devices to minute tolerances. Electronic radio waves, for example, can be produced from

zero to 18.5 thousand-million (giga) cycles per second to adjust electromagnetic environment metering devices. Scales can be calibrated to tolerances of one 35-millionths of an ounce.

Accuracy is the prime requisite of staff members. A photo-electric cell that turns light intensity into electrical energy to adjust a camera lens cannot be erroneously evaluated. Work under Charles W. Markley, lab chief, is delicate, precise and demanding for seven employees.

Transportation of sensitive instruments is sometimes more damaging to them than actual use, even when precautions are taken. To help minimize the danger of de-calibration "in transit," the Lab operates a mobile calibration bus. The vehicle takes its 2-man staff to the test equipment whenever possible. Adjustments can be made in the field to insure accuracy on the spot.

Electronic testing devices are subject to accuracy deviations even when not used, due to climatic changes or age. To insure accuracy of project support equipment, the Lab keeps a record file on nearly 7,000 pieces of equipment, which it calibrates every six months. The Lab is also responsible for certifying the standards to which the contractors must calibrate their equipment.



USAEPG technician Martin L. Dayton adjusts impedance measuring console, one of many devices used at the Standards and Calibration Laboratory to test Army equipment.

CDC Marks 2nd Anniversary as Doctrine, Concepts Organization

June 20 is the second anniversary of the U.S. Army Combat Developments Command, a key organization that has a problem of promoting understanding of its mission because it deals largely with futuristic ideas.

Public relations personnel at the CDC necessarily take the visionary approach in telling the public about the Command, in that it is primarily concerned with imaginative objectives—how to arm, equip, train and develop strategic concepts for the combat soldier “yet to be born.”

The CDC mission, as the Army's smallest command, is centered in the task of taking full advantage of the military products of advanced technology by the formulation of appropriate doctrine and concepts to exploit current and anticipated capabilities.

Lt Gen Dwight E. Beach, former Chief of Research and Development who now heads the CDC, has described Command responsibilities as “planning for the future while being completely aware of the realities of the present.”

Publicizing what long-range plans and objectives are being developed would be telling the potential enemy what to anticipate and prepare to counteract. The CDC necessarily has to go about its business quietly. When the need arises, new doctrine and equipment must be ready, as well as the highly trained personnel.

Despite the uniqueness and complexity of its functions, after two years of “shakedown” in methodology

the CDC of June 1964 is termed a going concern” whose impact affects the entire Army system from R&D to procurement.

Staffing and functioning procedures are established for effective operations, Command officials report, and personnel are well oriented to their responsibilities, particularly with respect to the major question: “Is the User getting what he needs?”

For those who feel that progress is reflected only through statistics, the CDC produced 51 Qualitative Materiel Requirement forecasts (QMRs) during the first 21 months of its existence. Many of these can be called “interim” systems while the Command points steadily toward “ultimate” systems as they are made feasible by advances in the state-of-the-art.

Qualitative Materiel Developments Objectives (QMDOs) also are being increased to give the developer more specific information on where and how the materiel will be used, and its relationship to doctrine and organization. The 180 QMDOs in the Combat Developments Objectives Guide (CDOG), chapter one, are being rewritten into a new format or as a new QMR, in accordance with the capabilities of science and industry.

Some 180 SDRs (Small Developments Requirements) also are in process—52 in the CDOG, 102 in development agencies, 28 in CDC Headquarters, and 22 in lateral commands (U.S. Continental Army Command, overseas, etc.).

The CDC's primary focus since its creation has been on its tactical doctrine and organization role—How shall the Army be organized to fight?

Considerable progress is reported on the backlog of studies in various stages of completion when inherited from other commands in June 1962. In general, they have been tied into existing or programed materiel developments, and related to current or future doctrine and organization.

New materiel concepts are being scrutinized rigorously *before the design stage* to assure there is, or will be, a tactical, organizational and logistical worthwhile increase in the Army's worldwide combat capability.

In its “watchdog” role in the development cycle, the Command continues to work closely with the Office of the Chief of Research and Development, but now also orients more closely toward the interests of the Assistant Chief of Staff for Force Development.

CDC's doctrinal - organizational - logistics wheel-horses are still the Combined Arms Group at the Command and General Staff College, the Combat Service Support Group at Fort Lee, Va., and various “expertise” agencies.

For example, the Institute of Advanced Studies at Carlisle Barracks, Pa., supported CDC's deliberations on the anticipated and projected tactical worth of materiel concepts which could be termed “world environment forecasts.” Similar, but more technical, were studies made in its specific field by the CDC Nuclear Group at Fort Bliss, Tex.

In 1963 the CDC activated the Command Control Information Systems Group (CCIS-70s) at Fort Belvoir, Va., to take a long-range objective look at ADPS (automatic data processing system) hardware from the viewpoint of requirements of field commanders.

The CCIS Group has directed its investigation generally into the areas or types of information the tactical decision-maker could logically have machine-processed for him, and toward the “software” needed to insure that ADPS equipment provides it in time.

The CDC's Combat Developments Experimentation Center at Hunter Liggett Military Reservation, Fort Ord, Calif., has continued to expand its activities and to increase their tempo in running many of the planning concepts through scientifically controlled and evaluated conditions.

ASAP Meeting at CDEC Attracts R&D Leaders

Department of Defense and Army R&D leaders joined with the Army Scientific Advisory Panel in reviewing functions and capabilities of the Combat Developments Experimentation Center, May 25-26.

The spring meeting of the Panel at CDEC Headquarters, Fort Ord, Calif., was featured by a series of experimentation demonstrations, including the use of the new “hit-kill indicator” for tank combat, a battalion tank attack, Armored Cavalry reconnaissance and a river crossing, and phases of the Army aircraft survivability tests.

Assistant Secretary of Defense (DDRE) Eugene G. Fubini and Assistant Secretary of the Army (R&D) Willis M. Hawkins attended, along with Lt Gen Frank S. Besson, Jr., CG of the Army Materiel Command; Lt Gen William W. Dick, Jr., Chief of R&D; Lt Gen Dwight E. Beach, CG of the Combat Develop-

ments Command; and other high DoD and Army leaders.

Brig Gen Charles J. Girard, CG of the host installation, headed the briefing and demonstration team in showing the methodology used in experimentation for generation of field data, and the techniques for objective evaluation of concepts and doctrine.

The central theme of the meeting was the application of scientific and military resources to the conduct of field experimentation in the development of materiel and methodology. Demonstrations were conducted at the Hunter Liggett Military Reservation by elements of the 194th Armored Brigade commanded by Col Carl C. Edmonson, and a visit was made at the Tactical Simulation Center.

Among the principal speakers were Mr. Hawkins, General Beach and Dean Morrough P. O'Brien, chairman of the Army Scientific Advisory Panel.

One phase in this evaluation is the current testing of the 11th Air Assault Division at Fort Benning, Ga., where the Military-Scientific Test, Evaluation and Control Group is headed by Brig Gen R. R. Williams.

In two years the CDC has remained organizationally stable except for minor changes. Responsibilities for studies were redefined between the Plans Directorate and the Director of Doctrine, and the latter assumed the Field Manual mission from the Organization Directorate. The Materiel Directorate dropped Requirements from its title, and the Evaluation Directorate was shortened from Operations Research and Evaluation Directorate, along with its expansion to include a Tactical Air Mobility Div.

11th Air Assault Division Tests New Tractor (BEST)

Three versions of an experimental Ballastable Earthmoving Sectionalized Tractor (BEST), developed by the U.S. Army Engineer R&D Laboratories, Fort Belvoir, Va., were delivered in May to Fort Benning, Ga., for tests by the 11th Air Assault Division.

Designed to meet air assault requirements for "high-density, mobile, flexible utilitarian equipment," the BEST provides for the application of a wide variety of center sections to standard front- and rear-powered axle units.

Initially fabricated by the Caterpillar Tractor Co. (as the rubber-tired Universal Engineer Tractor, UET), the BEST modifications to the front- and rear-powered sections were developed by Barnes and Reinecke and the center sections by Le Tourneau-Westinghouse.

The 6,300-pound front section contains powered wheels, operator's com-

The CDC conducts its activities through seven subordinate headquarters and 20 agencies, along with the Test, Evaluation and Control Group and currently with the 11th Air Assault Division in creating and evaluating new concepts from the viewpoint of their total effect upon the Army's battlefield effectiveness, projected to many years and environments in the future.

While the Command does not create hardware in the sense of production, it does provide advance "consumer research" for the soldier-user when ideas and concepts are in the embryo stage, leading to changes or redesign at an early stage in the interest of developmental economy.

partment, steering mechanism and a universal plate for a bulldozer blade and other attachments.

The 8,500-pound rear section has powered wheels, a 250 hp. diesel engine, auxiliary power and an SAE mounting plate for a towing winch, crane, backhoe and other attachments.

A family of construction equipment can be readily formed by joining a scraper bowl, grader, compactor, membrane layer, flat-bed trailer or a tanker to either basic unit. (See artist's concept, below, of various BEST configurations in operation.)

Slated to go through air assault tests this summer are basic units with an A-frame, and 3-piece units with scraper and grader sections in the middle. All items will be equipped with bulldozers or front-loading buckets. Fall tests, beginning in September, will include the complete family of equipment.

Pace Exceeds Schedule On Night Vision Facility

Construction of a \$1.7 million night vision laboratory is running ahead of schedule at the U.S. Army Mobility Command's Engineer Research and Development Laboratories, Fort Belvoir, Va.

Started in August 1963 and due for completion by Nov. 3, the building was 62 percent complete as of May 1, five percent ahead of schedule. The 200-foot-long, 5-foot-diameter underground tunnel which will permit complete dark room research on night viewing devices has been installed.

The main structure of a roof-top laboratory for long-range sighting experiments, another special feature of the building, is also in place.

A third feature, "clean" rooms separated into four categories of progressively higher sanitation requirements, will be the last installed. These will avoid contamination of materials in solid state research.

Workmen are now installing windows, mechanical and electrical equipment and interior masonry. The laboratory will have approximately 50,000 square feet of floor space and the design permits easy change of room sizes and changes in utility services, as required by the infrared, image intensification and battlefield illumination research and development to be conducted there.

The Thomas Concrete Construction Co. of Rockville, Md., is erecting the building, Victor B. Spector and Associates of Falls Church, Va., are the architects, and the Norfolk (Va.) District of the Corps of Engineers is supervising construction.

DDC Adds 800 New Terms To Thesaurus of Descriptors

More than 800 new terms from "ABO Incompatibility" to "Zoomastigina" are included in the first supplement to the Defense Documentation Center's (DDC) *Thesaurus of Descriptors*.

Dr. Robert B. Stegmaier, Jr., administrator of DDC, has announced the supplement to the Thesaurus, Second Edition, increases the DDC vocabulary for retrieval to more than 6,000 terms used by document analysts at the Center's headquarters, Cameron Station, Alexandria, Va., for indexing scientific and technical reports.

The DDC collection now totals more than 700,000 titles. The supplement has been issued in a limited edition primarily to assist DDC processing personnel and allied organizations using the Thesaurus.



Artist's concept of various configurations of BEST in operation.

Briefing Reviews Tech Info on Survey Progress

Department of Defense agency representatives were briefed May 15 on the progress of a "DoD Study to Determine How Scientific and Technical Information is Acquired and Used by Research, Development, Test and Evaluation Personnel."

The briefing was presented by the Auerbach Corp., conducting the study under a contract with the Advanced Research Projects Agency and for the Defense Director of Technical Information.

The aim of the study is to provide a comprehensive insight into how Department of Defense scientists and engineers obtain and use scientific and technical information. The Auerbach Corp. has developed an interview guide for use in questioning about 1,500 personnel selected at random from 35,000 in DoD Research, Development, Test and Evaluation (RDT&E) elements.

The interviews average about two hours in duration and are designed to reveal both objective and subjective information. Data is concise enough to be punched on cards and entered into electronic data processing equipment. Auerbach and DoD specialists will search the quantitative data for significant patterns of information acquisition and usage for each segment of the RDT&E community.

Supplementary information from narrative comments will clarify the

meaning of the quantitative data and reveal new patterns that could not be recorded in the more rigidly structured portion of the guide.

Preliminary to the basic study was a pilot test of the interviewing procedures and questions to refine the final version. Field interviews began late in April and will continue at Defense installations all over the country. The 1,500 persons being interviewed are expected to reveal a cross-section of the widely divergent and heterogeneous RDT&E population. Interviews are private and confidential.

Basic information about each person's job and on a specific RDT&E task recently finished are obtained, along with an estimate of the specific information desired and obtained to complete this task.

The study is not concerned with the flow of current awareness information nor with the indirect transfer between the current awareness and task-related needs.

Aberdeen P.G. Technician Wins Director's Award

The Director's Award for Outstanding Technical Excellence at the U.S. Army Development and Proof Services, Aberdeen Proving Ground, Md., has been won by a 21-year veteran employee of the organization.

Col Eugene C. Barbero, director of AD&PS, presented the award to Robert N. Dempsey, a mechanical engineering technician, at May 11 ceremonies. The plaque and citation recognized research on 105 mm. ammunition for the M60 tank, resulting in a substantial economy.

Established in 1962 by Col George H. MacBride, Ordnance Corps, then director of AD&PS, the award is for performance on a technical project or for studies that yield "highly significant results or improved test technology" in engineering or related fields.

Proving ground tests of M60 tank ammunition in 1962 revealed that one of the types (ammunition was being supplied by several manufacturers) did not meet required accuracy standards, although the manufacturer was complying with specifications.

During 1962-63, Dempsey performed exhaustive tests to isolate the cause of the inaccuracy, and finally developed a fixative preparation which corrected the deficiency. The award for his work recognized that, at negligible cost to the Government, he had improved performance of munitions valued at several million dollars an-

Decision Gives R&D Leaders Nod Over Celebrated Beatles

Officially, it has been decided that England's celebrated Beatles must play second guitar to the U.S. Army's top R&D Leaders in the matter of air priorities, even when the Beatles are on home ground in London.

Assistant Secretary of the Army (R&D) Willis M. Hawkins and Chief of Research and Development Lt Gen William W. Dick, Jr., returned May 11 from a trip to England during which they met with the U.S. Army Standardization Group, United Kingdom.

The Beatles were trying to slip out of town un-noticed and avoid a crowd of several thousand at the London airport, at the same time as ASA (R&D) Hawkins and his party were scheduled to take off from Northolt. For a while it was touch and go as to who would rate priority, but the official decision favored the R&D group.

Power Sources Meet Draws Over 1,200 to New Jersey

More than 1,200 representatives of Government and industry attended the 18th Annual Power Sources Conference held at Atlantic City, N.J., May 19-21, under sponsorship of the U.S. Army Electronics Laboratories.

As the world's largest annual meeting on power sources, the parley covered all types of electrochemical batteries, thermoelectric and thermionic devices, solar energy conversion and electric-to-electric conversion and control systems.

In recognition of the vigor and growth of the newest technology in this area, the entire first day was devoted to discussions on fuel cell batteries. The morning session was chaired by Col C. R. Dunlop of USAEL.

Arthur F. Daniel, director of the Power Sources Division, USAEL, was chairman, and Col James M. Kimbrough, Jr., USAEL director, was the principal speaker at the conference banquet.

nually; also, that his research yielded a much better understanding of the design fundamentals.

After serving during World War II as a ski trooper with the 10th Mountain Division of the U.S. Army in Italy, achieving the rank of sergeant, Dempsey joined the AD&PS and became an engineering technician with only a high school educational background.

Presently he is head of the Kennedyville (Md.) Volunteer Fire Company, a service officer for American Legion Post No. 246 in Betterton, Md., and a member of the Legion National Security Council.



Robert N. Dempsey receives Director's Award for Outstanding Technical Achievement from Col Eugene C. Barbero, director of D&P Services.



Dr. Edwin R. Dusek



Benjamin L. Harris



Lt Col E. M. Gershater



Charles W. Sandlin

Armed Forces Industrial College Picks 4 in Army R&D

Three civilians and one officer employed in Army research and development are among early selectees for the 10-month course of the Industrial College of the Armed Forces in Washington, D.C., next August.

The R&D personnel, among 180 selected throughout the Department of Defense by May 15, are Charles W. Sandlin, Dr. Edwin R. Dusek, Benjamin L. Harris, and Lt Col Ephraim M. Gershater.

The mission of the Industrial College, located at Fort McNair, is to provide key personnel with a general background of knowledge of the economic and managerial aspects of national security in their broad political, social, scientific and military context.

To be eligible for the school, personnel must demonstrate, among other things, a potential for advancement in the Department of the Army, must show ability to master complex subject matter quickly, and evidence an appreciation of the problems involved in economic, political and business planning and operations of the Army.

CHARLES W. SANDLIN, the first civilian selected from the U.S. Army Missile Command at Redstone Arsenal, Ala., to attend the Industrial College, is a civil engineering graduate of Auburn University. Employed at the Arsenal since 1951, he is now serving as deputy chief and technical director, Engineering Division of the Procurement and Production Directorate.

DR. DUSEK, author and coauthor of numerous technical and scientific publications on the effects of temperatures on human performance, was selected from the U.S. Army Research Institute of Environmental Medicine (ARIEM), Natick, Mass.

Assigned as chief scientific adviser for military performance at ARIEM, Dr. Dusek formerly served as head of various psychology elements at the U.S. Army Natick Laboratories (1961-

64) and at the Quartermaster R&D Command at Natick (1953-61).

He attended the Universities of Texas (1943), Oregon (1943-44), and Missouri, where he received his B.A. degree (1947), earned M.A. and Ph.D. degrees from the State University of Iowa (1947-51), and was an assistant professor at the University of Arkansas from 1953 to 1955.

DR. HARRIS, director of Developmental Support at the Chemical R&D Laboratories at Edgewood Arsenal, Md., since 1962, attended the Johns Hopkins University, where he earned his B.E. and Ph.D. degrees (1934-41).

Joining the Chemical Corps Technical Command at Edgewood Arsenal, Md., in 1941 as a chemical research engineer, he served until 1946. After serving as owner and president of an engineering research firm in Baltimore, Md., and also as assistant pro-

fessor of chemical engineering at Johns Hopkins University from 1946-53, he joined the Chemical R&D Command as deputy assistant for toxic chemical warfare. In 1955 he became assistant to the scientific director of the Chemical R&D Laboratories, advancing in 1960 to deputy director of Development and then to director of Developmental Support.

LT COL GERSHATER is currently assigned as chief, Special Operations Division, U.S. Army Biological Laboratories, Fort Detrick, Md.

A graduate of the University of Nebraska, where he received B.A., M.A., and B.S. degrees (1939-49), he earned a bachelor of military science degree from the University of Maryland (1949-54). He has attended the U.S. Army Command and General Staff College, the Army Infantry and Chemical Schools, the Censorship-Counterintelligence School, and Defense Atomic Support Agency School.

Computers Used to Aid DoD Personnel in Finding Jobs

A computer-operated pilot program is being initiated by the Department of Defense in a 6-state region to expedite placement of DoD employees losing jobs through base closures and personnel reductions.

The Centralized Referral Activity has begun operating in the Chicago Civil Service Region, which encompasses the states of Illinois, Michigan, Wisconsin, Indiana, Ohio and Kentucky. Approximately 105,000 civilian employees are located at over 70 DoD installations in the region.

Throughout the U.S. 10,056 DoD employees will be phased out of jobs by the base closures and personnel reductions in Secretary of Defense Robert S. McNamara's \$68 million economy program announced Apr. 24. Such employees now have priority rights to vacant positions for which they qualify at other DoD activities.

Purpose of the computerized placement system is to improve techniques

for matching the skills of displaced employees with job vacancies and to speed up and centralize the referral and placement of employees with priority placement rights.

The Centralized Referral Activity will be located at Dayton, Ohio, and will be operated by the Defense Electronics Supply Center. Expansion of the system into other Civil Service regions is planned after the pilot-test phase.

All DoD installations with displaced employees will register them with the Centralized Referral Activity. The installations will receive lists of job categories for which displaced employees are qualified, but will not be permitted to hire new employees.

As vacancies occur in the job categories for which displaced employees are available, the Centralized Referral Activity will forward data, matching jobs and employees, to the DoD activities for consideration.

USAR R&D Units Aid Junior Science Fairs Throughout U.S.

Under a policy initiated by the Chief of Research and Development in 1963, Army Reserve R&D Units took an active role in promoting and assisting local and regional high school science fairs preliminary to the National Science Fair-International, May 6-9.

The Army has supported Science Service, the nonprofit agency which promotes the NSF-I, for a number of years but the Reserve R&D Units were not invited to assist the agency in conducting the program until 1963.

The policy established by the Chief of Research and Development asked Reserve R&D Units (some 1,200 Reservists in 70 units in all parts of the U.S.) to join with Science Service in stimulating student participation in the local and regional fairs.

Reservists were requested to serve as counsellors and judges, and were authorized to present, on behalf of the Department of the Army, special Certificates of Achievement.

The policy permits Reservists to earn retirement credits for judging, planning, lecturing, demonstrating, counselling or providing other services in support of a Science Service approved fair.

Members of Reserve R&D Units are highly trained scientists, engineers,



Col A. J. deRosset, 5008th U.S. Army Reserve R&D Unit, congratulates Richard Kiefer, whose physics exhibit in the Chicago Public Schools Science Fair won top Army prize. Flying by military aircraft, he will tour the U.S. Army Air Defense Center, Fort Bliss, Tex.; White Sands, (N. Mex.) Missile Range, where he will see firings of Nike Zeus and other missiles; North American Air Defense Command; U.S. Army Air Defense Command; and U.S. Air Force Academy, Colorado Springs.



Capt Wallace McCord, 2353rd USAR R&D Unit, Morgantown, W. Va., presents Army Certificate of Achievement to Tim Miller, Parkersburg High School, for his ruby Laser entry in Salem College Regional Science Fair.

technicians and scientific managers, many of them in highly responsible positions with industry, and consequently have been able to give valuable assistance to Science Service in conducting the local level fairs.

The Army Certificates of Achievement, signed by Watson Davis, director of Science Service and by Chief of Research and Development Lt Gen W. W. Dick, Jr., may be awarded for outstanding exhibits at local and regional junior science fairs. Exhibits may be in the fields of guided missiles and rockets, biological medical research, electronics, mathematics, computers, transportation devices, foods research and various other basic research areas.

The Army plan further provides that the certificates may be furnished to directors of local level high school science fairs for presentation on behalf of the Army in areas where USAR R&D Units are not readily available for assistance. Requests for certificates may be made directly to the U.S. Army Research Office, Department of the Army, Washington.

When science fair directors reply to Science Service about participation in the NSF-I, indicating also their desire to participate in the Army Certificate of Achievement awards, the information is forwarded to the Chief of Research and Development.

Reservists in R&D Units nearest to the fair are notified and they then contact fair officials to volunteer assistance. In some cases, Reservists may have to drive from 50 to 100 miles

to the fair and then put in a full day judging the exhibits and presenting awards. They pay their own expenses and frequently have to take a day of annual leave from their civilian jobs to participate.

If reports to the Office of the Chief of Research and Development are indicative, the Reservists do not mind the inconvenience of contributing their services to the fairs. The reports reflect enthusiasm for the rewarding aspects of the program.

An example of typical reaction came from five members of the 5002nd USAR R&D Unit at Denver, Colo., following a recent 60-mile drive to Boulder, Colo., to serve as judges in the Colorado-Wyoming NSF-I competition. Lt Col Robert A. Cadigan, Unit commander, Lt Col Richard D. Burr, Maj Hansford T. Schacklette, Capt Paul T. Voegeli and Specialist 4 Gerald A. Teter described their experience as "stimulating, challenging and definitely worthwhile."

The principal criterion for awarding an Army Certificate of Achievement is that the exhibit has some application of interest to the Army. Considerable latitude is left to the discretion of the Army judges. Other criteria are creative ability, scientific thoroughness, skill, clarity and dramatic value.

The number of awards depends upon the size of the fair, the number of exhibits and decision of Army judges. Awards are not made unless the exhibit is outstanding; merely be-

ing the best of a number of fairly good exhibits is not sufficient. Excellence must be evident.

Army certificates are signed by the judge responsible for determining the recipients. If a panel of Army judges is established, the signature is that of the senior member of the panel. Awards are usually presented at appropriate ceremonies with attendant publicity.

Army R&D Reservists judging exhibits, presenting awards or acting in any other official capacity connected with the fairs wear uniforms to indicate official U.S. Army participation.

Whenever possible, tours or visits to nearby Army installations having research and development activities are arranged in connection with fair awards for students whose exhibits and scientific knowledge illustrate exceptional career promise.

For example, one-week tours with the Research and Development Directorate of the Rock Island (Ill.) Arsenal accompanied Army certificates presented this year to outstanding ex-

hibitors in the Quint-Cities Science Fair at Davenport, Iowa.

The 5210th U.S. Army Reserve R&D Unit members judged the Army awards in cooperation with representatives of the R&D Directorates of the U.S. Army Weapons Command and Rock Island (Ill.) Arsenal. Certificates were signed by the commanding officer of the 5210th Unit, Lt Col Marvin H. Linn.

Judge for the Army awards at the Worcester County (Mass.) Kiwanis Science Fair this April was Lt Col Alfred D. Caven, county planner for Franklin County, Mass. Col Caven, attached to the 1002nd U.S. Army Reserve R&D Sub group, is a former college professor who taught for more than eight years at the University of Massachusetts and Michigan State University.

A graduate of the Army Command and General Staff College, he has a master's degree from Harvard University and B.S. degree from the University of Kentucky. He observed that one of the youths, Roger La-

Plante of Bartlett High School, Webster, Mass., had developed an unusual project, "Weather Prognostication by Digital Computer."

Col Caven reported: "This student is outstanding in his knowledge of electronic computers and weather forecasting. He had a completely operating teletypewriter-computer complex which translated the national weather data, broadcast by radio from New Orleans, into confirmed predictions of the movement of high altitude wind currents. I strongly recommend that this young man be contacted by the Army."

Roger LaPlante is being contacted by Dr. Hoyt Lemons, chief, Geophysical Sciences Branch, Environmental Sciences Division, U.S. Army Research Office, Arlington, Va.

Army Symposium Covers Guerrilla War Techniques

Ambush detection techniques and devices suited to modern guerrilla warfare requirements were discussed at a recent Army-wide symposium at the U.S. Army Limited War Laboratory, Aberdeen Proving Ground, Md.

Approximately 100 Army research and development personnel, professors and experts from industry benefited from the presentation of 23 technical papers. Topics covered vision and visibility in tropical forests, concealment and camouflage, detection devices, and aerial surveillance.

U.S. Army Special Forces activities in guerrilla-type wars have catapulted age-old ambush tactics and their prevention into a top priority project for the Limited War Laboratory. Ideas pooled at the symposium, the first Army-wide meeting on ambush, will be evaluated by the LWL for potentialities of development.

Suggested solutions to the ambush detection problem included listening devices, radar, assorted electronic measures, advanced vision systems, and the use of trained dogs and pigeons.

PM-1 Sets Operating Record

The PM-1 nuclear power plant at Sundance, Wyo., recently established a new Army Nuclear Power Program record of 2,630 hours and 32 minutes continuous operation.

After surpassing the old record of 2,502 hours set by the PM-2A near the North Pole, over a year ago, the PM-1 was shut down for instrumentation modification, pressure thimble inspection, and installation of a new relief valve.

R&D Reservist Receives \$12,500 State Dept. Grant

U.S. Army Reserve R&D Unit Program promoters, who contend that it holds in constant readiness a wealth of skilled professional talent, can point to Dr. Jesse F. Bone as an example of many of like caliber.

Selected by the U.S. Department of State for a \$12,500 grant awarded under the mutual education and cultural exchange act, Dr. Bone will devote approximately nine months to lectures and organizational activities at the University of Assuit, United Arab Republic, starting in September.

As an active member of the 6161st Reserve Research and Development Unit in Corvallis, Ore., with the rank of lieutenant colonel, he has been in charge of several scientific research projects for the Army. Most of his work has been associated with interests of the Army Medical R&D Command of The Surgeon General's Office.

Listed on the Oregon State University staff as an associate professor of veterinary medicine, Dr. Bone will lecture at the University of Assuit in pathology and histopathology. He also will help to establish a pathology curriculum and a laboratory of pathology.

Following a 9-month tour of duty at the University, he will travel in Europe to the various centers for raising germfree experimental animals under controlled conditions, and

also will be concerned with establishing primate centers.

The University of Assuit, founded in 1957, is growing rapidly and is expected to have about 12,500 students this fall. Special emphasis in the curriculum is on the veterinary and agricultural fields. Two universities in Cairo and one in Alexandria have a total enrollment of about 90,000.

Dr. Bone received his B.S. and M.S. degrees from Oregon State University and was awarded a doctorate of veterinary medicine from Washington State. He has taught at Oregon State for 14 years, and this is his first educational assignment overseas.



Lt Col Jesse F. Bone

Government Agencies Formulating Federal Meteorological Plan

Representatives of 12 Government agencies are laying the groundwork for a Federal Meteorological Plan.

Under a Federal Committee for Meteorological Services and Supporting Research, with membership from the Office of the Secretary of Defense, two interdepartmental committees will coordinate meteorological plans.

The Interdepartmental Committee for Meteorological Services (ICMS) is concerned with operations. Army membership is provided by the Assistant Chief of Staff for Intelligence.

The Interdepartmental Committee for Applied Meteorological Research (ICAMR) will develop a long-range research and development plan. It will attempt to make a significant contribution to the coordination of Federal meteorological efforts before final submission of the Fiscal Year 1966 budget to Congress this fall.

Army member of ICAMR is Dr. Hoyt Lemons, chief, Geophysical Sciences Branch, Environmental Sciences Division, Army Research Office. Frances L. Whedon, meteorologist in the same Branch, is alternate.

Other ICAMR members represent the Department of State, the Air

Force, the Navy, and the Departments of Commerce, Agriculture, Interior and Health, Education and Welfare. Represented also are the Atomic Energy Commission, Federal Aviation Agency, and the National Aeronautics and Space Administration. The Bureau of the Budget delegate will be a nonvoting observer.

Each of the interdepartmental committees was established Dec. 23, 1963, in accordance with Bureau of the Budget Circular A-62, dated November 13, 1963. Organization action was effected by the Federal Coordinator for Meteorology, Dr. Robert M. White, chief of the U.S. Weather Bureau, under authority delegated to him through the Assistant Secretary of Commerce for Science and Technology.

Participating agencies must submit information on all FY 1965-66 meteorological or weather-oriented research and development programs to the Federal Coordinator for Meteorology for review.

The information will include agency research and development effort, scope of the effort, time-phased accomplishments, expected manpower assigned to the programs and capital expenditure for the increment of time.

The Federal Coordinator has begun reviewing the agency submissions. The various ICAMR sub-committees—Systems Design, Display, Processing, Acquisition, Communications, Research and Test Facilities, and Climatology—will consider the existing agency program in appropriate detail.

The ICAMR will then review the subcommittee inputs to the Federal Plan, in an attempt to resolve agency differences and also to consider the balance of resources versus requirements in all program areas.

Changes made by the ICAMR will be incorporated into the reports, unresolved differences will be highlighted and documented, and the entire package must then be forwarded to the Federal Coordinator for Meteorology.

Preparation of the Federal Plan by that Office must be completed and reviewed and approved by the ICAMR in time to meet the needs of BOB.

Once overall objectives are established, individual agency objectives will be determined. Their time-phased programs will be formulated and integrated into the long-range Federal Meteorological Plan.

The ICAMR will be directly responsible to the Federal Coordinator for Meteorology for:

- Developing the portion of the proposed Federal Meteorological Plan for efficient utilization of resources in providing meteorological research, development and testing to meet valid user requirements.

- Recommending changes in the Federal Meteorological Plan based on a continuing, systematic review of current and programmed meteorological research, development and testing against efficient utilization of resources and mission requirements.

- Reporting periodically on the implementation of the Federal Plan.

- Coordinating matters relating to conduct of meteorological R&D and testing affecting more than one member agency.

- Considering such other matters relating to planning and conducting meteorological R&D and testing by the U.S. Government as may be directed by the Federal Coordinator.

The ICAMR will not be responsible for matters relative to:

- Exercise of quasi-judicial functions or meteorological research, development and testing involving special military security consideration.

- Direct coordination of meteorological research that is clearly basic.

Dr. Reilley Succeeds Dr. Marcuvitz in ODDR&E

Dr. Edward M. Reilley was promoted May 7 to assistant director, Defense Research and Engineering (Research) after serving as deputy assistant since January, succeeding Dr. Nathan Marcuvitz, who resigned.

Dr. Reilley came to the Department of Defense from Fort Monmouth, N.J., where he was director of the Institute for Exploratory Research, U.S. Army Electronics Research and Development Laboratory (1958-1963), and the assistant director of research (1955-1957).

Born in Ellwood City, Pa., Apr. 15, 1919, he has been an educator, research administrator, and Government consultant.

A 1940 graduate of Carnegie Institute of Technology with a B.S. degree, he received his Ph.D. from the University of Pittsburgh in 1951. He served as a physicist at the Mellon Institute (1940-1942) and became a research engineer at the Electronics Research Laboratory, University of Pittsburgh (1946-1948) before serving as a research associate in the Radiation Laboratory and later as an instructor in physics.

A member of the Army Mathematics Panel (1954-1955), the Joint Serv-



Dr. Edward M. Reilley

ices Technical Advisory Committee on Electronics (1946-1964), and the Ionospheric Research Committee AGARD, he also served as chairman of the Army Scientific Advisory Group (Physics) in 1958-1962 and chairman of the DoD Coordinating Committee on Science in 1962.

Dr. Reilley entered active military service as a Signal Corps officer in 1942 and was awarded the Bronze Star during his service in Europe, leaving active duty as a major in 1946.

Army Honors Top Mathematician Upon Retirement



DISTINGUISHED MATHEMATICIAN, Dr. Rudolph E. Langer, takes center among friends during activities in his honor. Left to right are University of Wisconsin President F. H. Harrington, Director of Army Research Brig Gen Walter E. Lotz, Prof. Langer, J. Barkley Rosser, director of Mathematics Research Center, United States Army, and Dr. S. C. Kleene, toastmaster.

Accolades befitting 37 years of service that gained international renown as a University of Wisconsin mathematician rewarded Dr. Rudolph E. Langer when he retired in May at age 70. The pleasant surprise was presentation of the Army's Outstanding Civilian Service Medal at an honorary banquet.

About 280 friends and associates turned out to pay tribute to the director of the Mathematics Research Center, U.S. Army, from its inception in 1956 until he retired. The MRC is on the University of Wisconsin campus.

The banquet climaxed a symposium to honor Dr. Langer, dealing with "Asymptotic Solutions of Differential Equations and Their Applications," May 4-6. More than 120 representatives of the Department of Defense and other Government agencies, industry and major universities in the United States and Canada participated in the symposium.

In presenting Dr. Langer with the Army Outstanding Civilian Service Medal, Director of Army Research Brig Gen Walter E. Lotz, Jr., credited him for much of the success of the MRC as its "guiding genius." He noted that it was the first time the Medal has been awarded to a mathematician through the auspices of the Chief of Research and Development.

Dr. Langer began his distinguished career at Wisconsin in 1927, after serving as an instructor and professor at Brown, Dartmouth, Harvard, Stanford, Ohio State and the University of Texas. Many of his publications had a profound impact on advanced mathematics techniques, and numerous hon-

ors have been conferred upon him by professional mathematical societies.

Prominent speakers at the symposium and their topics included: Wolfgang Wasow, MRC, Asymptotic Series for Differential Equations: Trends and Problems; Hugh L. Turrington, University of Minnesota, Solvable Related Equations Pertaining to Turning-Point Problems;

Robert M. Lewis, Courant Institute of Mathematical Sciences, Asymptotic Methods for Dispersive Hyperbolic

Equations; Robert W. McKelvey, MRC and University of Colorado, Asymptotic Solutions and Boundary Value Problems;

C. C. Lin, MIT, Turning Point Problems in Hydrodynamics and Astrophysics; Yasutaka Sibuya, University of Minnesota, On the Problem of Turning Points for Systems of Linear Ordinary Differential Equations of Higher Orders;

Frank W. J. Olver, National Bureau of Standards, Error Bounds for Asymptotic Expansions With an Application to Bessel Functions of Large Argument; Robert A. Clark, Case Institute of Technology, Asymptotic Solutions of Elastic Shell Problems;

Arthur Erdelyi, California Institute of Technology, Integral Equations in Asymptotic Theory; Nicholas D. Kazarinoff, University of Michigan, Turning Point Problems in Diffraction Theory.

Proceedings will be published in a hard cover book edition. Persons interested in further details of any of the above topics should address correspondence to Dr. J. Barkley Rosser, director, Mathematics Research Center, U.S. Army, University of Wisconsin, Madison, Wis. 53706.

Dr. Rosser took over duties as MRC director upon Dr. Langer's retirement. For initial retirement story and Rosser-Langer biographies, see December 1963-January 1964 issue of the *News magazine*.

DIAC Hears Reports on Defense-Industry Problems

Discussion continued on a number of problems facing the Defense community and private industry in their relationships during the seventh meeting of the Defense Industry Advisory Council (DIAC) at the Pentagon, May 8-9, Washington, D.C.

The Council heard reports on the problems by special study groups but issued no recommendations. Cyrus R. Vance, Deputy Secretary of Defense, is chairman of DIAC and presided both days.

The Council was established May 23, 1962 to provide a direct and immediate contact between the Secretary of Defense and his principal management assistants and members of industry.

Thomas D. Morris, Assistant Secretary of Defense (Installations and Logistics), is alternate chairman. Dr. Ruben F. Mettler, of TRW Space Technology Laboratories, is industry vice chairman.

The Council discussed these problem areas following committee reports:

- Guidelines defining an effective contractor cost reduction program and

methods for obtaining greater competition among subcontractors.

- A proposal for providing guidance on and improving the source selection process.

- A proposal designed to provide inducement for contractors to provide plant equipment in support of Defense contracts.

- A study of requirements for the periodic retraining of scientific and technical personnel by Government as well as industry.

- Unallowable costs in Government contracts.

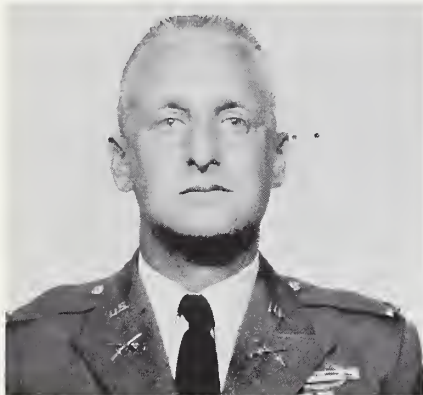
- Costs which may be allowed for independent research and development by Defense contractors.

- A revision to Section IX, Part 2 of the Armed Services Procurement Regulations (ASPR) pertaining to technical data.

- Current techniques for recording technical data in a form which permits rapid search and retrieval, thus eliminating unnecessary addition of parts to Defense inventories.

- Relaxation of management controls on Defense contracts.

4 Officers Join OCRD in Staff Positions



Lt Col W. W. Nairn, III



Maj William K. Marr

Four officers were assigned to the Office of the Chief of Research and Development in recent weeks, including two to the U.S. Army Research Office (USARO).

Lt Col William W. Nairn, III, has been assigned as military adviser to the Special Operations Research Office, Human Factors and Operations Research Division, USARO. For the past two years he was U.S. Military Academy adviser, an Infantry adviser, and then chief to the U.S. Army Mission in Honduras.

His extensive military schooling includes Infantry courses, the Command and General Staff College, Naval War College, Army Language School and Military Assistance Institute.

He holds a B.S. degree from the U.S. Military Academy (1947), plus advanced engineering training for several years at Amherst College and the University of Maryland. His decorations include two Silver Stars, Bronze Star, and Purple Heart.

MAJ WILLIAM K. MARR is the new chief of the Reference Branch, Scientific and Technical Information Division, U.S. Army Research Office. Recently he served a year as a military adviser to the South Viet Name Army, two years with the 82nd Airborne Division, Fort Bragg, N.C., and nearly six years in Germany.

During World War II service in Germany and in the Korean War, he earned the Soldier's Medal, Bronze Star, Combat Infantry Badge and Master Parachutist Badge.

His military schooling includes the Officer's Advanced Course, Fort Benning, Ga., Command and General Staff College and also the Nuclear Weapons Course at Fort Leavenworth, Kans.; Army Language School, Monterey, Calif., Army Parachute School, Fort Benning, Ga.

LT COL LAWRENCE V. HOYT,

assigned to the International Division, OCRD, has been an instructor at the Engineering School at Fort Belvoir, Va., and the Command and General Staff College. He has served with G-3 Plans, 4th Infantry Division in Germany, G-3 Training, and the

Arctic Bibliography Gives U.S. Entry Edge

English language entries in Volume 12 of the *Arctic Bibliography*, which is ready for the printer, exceed those in Russian, reversing the pattern of the previous two volumes. The volume will not be ready for distribution for several months.

The *Bibliography* is a continuing series of abstracts of scientific literature on the arctic and subarctic regions of the world and is handled by the Arctic Institute of North America. Funds for the project come from several United States and Canadian Government agencies. The U.S. Army is one of the major supporters.

Volume 12 consists of about 1,600 pages and contains abstracts of 7,270 publications. Of the entries, 3,360 are in English, 3,165 in Russian, 493 in the Scandinavian languages, 112 in German, and 140 in French and other languages.

This contrasts with Volume 11's 6,607 scientific publications abstracted and indexed, of which 2,990 were in Russian, 2,638 in English, 482 in the Scandinavian languages, 313 in German and 184 in French and other languages.

The papers abstracted in Volume 12 are preponderantly recent, with 2,547 having been published in 1962, 3,610 in 1961 and 672 in 1960.

In the first nine volumes of the *Bibliography*, English language entries always exceeded those in Rus-

3rd Armored Division, Fort Knox, Ky. During the Korean War he earned the Silver Star, Bronze Star and Purple Heart with OL Cluster.

Graduated from the U.S. Military Academy (1948), he has attended the U.S. Marine Corps Junior School, Quantico, Va. (1951-52), Command and General Staff College (1958-59) and the Armed Forces Staff College, Norfolk, Va. (1962-63).

MAJ LAWRENCE P. CROCKER has been assigned to the Atomic Office, OCRD, after having served as project officer at Army Reactors Branch, U.S. Atomic Energy Commission; and technical liaison officer between Army Reactors Branch, U.S. Atomic Energy Commission and the Oak Ridge National Laboratory, Oak Ridge, Tenn.

During the Korean War he earned the Bronze Star. Graduated from the U.S. Military Academy in 1951, he has completed the Engineer Officer's Basic Course at Fort Belvoir, Va., and the Command and General Staff College. Civilian schooling includes an M.S. in nuclear engineering from Iowa State College in 1956.

sian but the trend reversed with Volume 10 and continued into 11.

Results of the International Geophysical Year 1957-58 and its sequel, the International Geophysical Cooperation, began to appear in some quantity in Volume 11. Though the Arctic was not of direct concern to the IGY program, many countries conducted research at Arctic stations.

Marie Tremaine, editor and director of the *Arctic Bibliography* since its inception in 1947, has noted some recent arctic research trends:

- Natural resources of northern regions including mineral, oil and gas searches.
- Use of atomic energy in the Arctic.
- Fishing in the northern seas and its potential to food supplies.
- The northern forest industry, wildlife resources and hibernation.
- Social sciences, such as cultures of indigenous peoples and changes in livelihood and community life.

The *Arctic Bibliography* has been highly regarded in Western nations and the Soviet Union for years and hailed as indispensable to northern research workers by the *Scientific Monthly*.

The U.S. Army distributes 150 copies of the *Bibliography* to all interested Army agencies. Volumes may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Contracts Topped by 'Multi-Year' Award

Major savings will result from production of the U.S. Army's newest and most efficient man-pack radio, the AN/PRC-25 walkie-talkie, under an innovation known as the "multi-year" contract.

The concept effects a 25 percent lower unit cost than previous procurement of the same radio by obligating the Government to a buying agreement over two years or more. The contractor thus may charge off his tooling and production expenses over a longer period than under the standard one-year contract.

Model Engineering and Manufacturing Corp., Huntington, Ind., will produce the radios for \$12 million. The AN/PRC-25, developed by the U.S. Army Electronics Laboratory, Fort Monmouth, N.J., weighs slightly less than its predecessors, and takes the place of the PRC-8, 9 and 10, each of which operated on a separate FM band. All of the bands are combined in the new set.

Contracts awards reported by the U.S. Army for research, development and production of materiel from Apr. 15 to May 15 totaled about \$100 million, the lowest total for the current fiscal year, as follows:

General Dynamics Corp., Pomona,

Calif., \$11,873,771 modification for Mauler weapons systems; Chrysler Corp., Detroit, Mich., three contracts totaling \$7,996,926 for production of pick-up and cargo trucks, M17A1 range finders and equipment to convert the M48E2 tank to the M48A2C;

Raytheon Co., Lexington, Mass., two contracts totaling \$6,056,221 for production of modification kits and ancillary items which will increase power of radar sets and for further design and development of Hawk surface-to-air missile system;

The Regents of the University of Michigan, Ann Arbor, Mich., a \$5,700,000 cost-reimbursement contract for materials and research services; Kaiser Jeep Corp., South Bend, Ind., \$5,180,117 for M39 trucks;

Boeing Co., Vertol Division, Morton, Pa., two contracts totaling \$3,781,250 for engineering services on maintenance and modification of the CH-47 Chinook helicopter, components for 11th Air Assault Division, and research and development of small gas turbine engine components;

Mason Hangar, Silas Mason Co., Inc., New York, \$3,285,931 to load, assemble and pack various types of ammunition, primers and detonators; Bethlehem Steel Co., Baltimore, Md., \$2,989,000 to install a new dredging process on the Corps of Engineers' sea-going hopper dredge, Goethals;

Goodyear Tire and Rubber Co., Akron, Ohio, two contracts totaling \$2,815,701 for tank shoe assemblies and tracks; Industrial Products Group, Denver, Colo., \$2,500,000 for classified electronics equipment;

Consolidated Diesel Electric Corp., Stanford, Conn., \$2,481,485 increment for first-year procurement of M10-8 flame throwers to be mounted on mechanized armored personnel carriers; International Harvester Co., Washington, D.C., two contracts totaling \$2,427,553 for various types of trucks and tractors;

Allison Steel Manufacturing Co., Phoenix, Ariz., \$2,264,400 for 90 Armored Vehicle Launched Bridges; Ingraham Co., Bristol, Conn., \$2,223,600 to produce 130,800 fuzes; Doc-O Manufacturing Corp., Sand Springs, Okla., \$1,926,501 for 2,200 cargo trailers;

Norris Thermador Corp., Los Angeles, Calif., \$1,871,738 for production of 155 mm. projectiles; General Motors Corp., Detroit, Mich., \$2,045,600 for production of 6-cylinder engines for XM106 and M113A1 vehicles;

Philco Corp., Newport Beach, Calif., \$1,777,354 for advanced production

engineering on the Shillelagh missile; Chamberlain Corp., Scranton, Pa., \$1,682,168 to produce 155 mm. projectiles; Harvey Aluminum Sales, Inc., Torrance, Calif., \$1,642,069 for production of various ammunition; M&T Co., Philadelphia, Pa., \$1,594,184 to prepare technical manuals for engineering-type and surface-type equipment; Monsanto Research Corp., Dayton Laboratory, Dayton, Ohio, \$1,540,657 for research services;

Teletype Co., Skokie, Ill., \$1,500,000 to produce electronics equipment; Fruehauf Corp., Fullerton, Calif., \$1,167,500 for 31 Sergeant ground support vehicles; Eastern Canvas Products, Inc., Haverhill, Mass., \$1,113,900 for manufacture of 27,600 protective hoods (ABC-M-5) and 300,000 M6 protective hoods to be used in conjunction with protective masks;

ITT General Controls, Inc., Hamamel-Dahl Division, Warwick, R.I., \$1,096,779 to furnish cryogenic valves, spool pieces and flow tests for Saturn V test facilities; Collins Radio Co., Cedar Rapids, Iowa, \$1,059,915 for 70 VC-102 radio sets;

Firestone Tire and Rubber Co., Akron, Ohio, \$1,049,991 for production of metal parts for 175 mm. projectiles; Piasecki Aircraft Corp., \$1,040,000 for design, modification and flight test of a TIAK 16-H-1 high-speed weapons helicopter for exploratory research;

Continental Motors Corp., Muskegon, Mich., \$1,033,146 for production engineering services of engines for M60 and M48A1 tanks; IBM Corp., Washington, D.C., \$1,000,000 for classified electronics equipment; Burroughs Corp., Detroit, Mich., \$1,000,000, also for classified electronics equipment; Ross Aviation, Inc., Tulsa, Okla., \$1,368,699 for conduct of primary fixed wing flight and synthetic instrument training of an estimated 1,109 students at Fort Rucker, Ala.

FASEB Publishes Report On Bio-Medical Forecasts

"The Rationale and Techniques for Long-Range Technological Forecasting in the Biological and Medical Sciences" is the title of a recently published study report prepared by FASEB.

Under a contract with the Life Sciences Division of the U.S. Army Research Office, the Federation of American Societies for Experimental Biology in Washington, D.C. conducted the study. Dr. Wendell H. Griffith, director, Life Sciences Research Office of FASEB, prepared the report.

Findings and conclusions cover the relation of forecasting to research, general considerations of forecasting, human factors, and the relation of physical resources to R&D progress in the biological and medical sciences.

Included in the report are suggested problems for study in forecasting, a method of preparation and use of a forecast, and summary of factors of importance in forecasting.

Copies of the 49-page document may be obtained from the U.S. Army Research Office, Life Sciences Division, 3045 Columbia Pike, Arlington, Va.



Radio Set AN/PRC-25(XC-3)

Studies Seek Increased Body Tolerance to Chemicals

By Dr. C. Jelleff Carr

Mithridates, King of Pontus, who was defeated by Pompeii in 63 B.C., was afraid of being poisoned. He attempted to develop an acquired tolerance for all of the well-known poisons of his day by exposing himself repeatedly to small doses of these poisons. He believed that in so doing, if the lethal potion came his way, he would be immune. Today, Mithridatism is used to designate an acquired tolerance to a poison or drug.

In our modern lives, with the growing concern about the continued ingestion of a large number of foreign chemicals in food, water and air, there is a new awareness of the problems of storage, excretion and inactivation of these foreign elements. Thus, modern man finds himself unwittingly playing the role of Mithridates of old.

The U.S. Army is particularly concerned with research studies of how scientific methodology can be applied to development of acquired tolerance to conditions unfavorable to combat troops now stationed in many parts of the world where viability factors are different than in the United States.

Work in a number of laboratories has demonstrated that it is possible to protect an animal organism against poisonous chemicals by prior administration of the chemical or a compound which is closely related to the chemical but itself harmless. Mithridates recognized that the repeated administration of a substance could lead to a marked increase in the tolerance of the body for this substance.

The modern toxicologist can easily show that repeated administration of a poison to the body increases the destruction of the agent by liver enzymes. Metabolism increases so that subsequent doses of the substance, or a closely related chemical, allows the body to metabolize and excrete the poison more readily. It is conceivable that already we have developed a considerable degree of tolerance to the insecticidal residues that find their way into the food we eat. It would be interesting to debate the possibility of tolerance and resistance to the radioactive elements that constitute a fallout in our environment and hence find their way into our bodies in increasing amounts.

Some remarkable discoveries have been made in very recent years that enable us to prevent selective poisoning. To understand these discoveries, we must consider the individual cells of the body and the way that chemical substances act upon these cells.

Research in Review...

This article by Dr. Carr initiates a new series of by-lined reviews by leading Army scientists on areas of research considered of broad general interest. Emphasis will be on the future military applications of research in specific disciplines and interdisciplinary areas. To be easily readable and understandable, the writing style will be simple and in layman's language.

The articles will be in the general nature of state-of-the-art reports or summaries in widely diversified areas of scientific activity in which the Army is engaged, encompassing virtually all of the major fields of research endeavor. Currently, the Army is involved in approximately 4,500 research tasks, including those in foreign countries.

Initial articles in the series will be prepared by scientists of the U.S. Army Research Office, OCRD, over a period of several months. As the tone, style and purpose of the articles become generally known, contributions of similar articles from leading scientists, engineers and scientific administrators throughout the Army will be invited.

The Cell as the Living Unit. One of the fundamentals of drug therapy in modern medical practice is the understanding that drugs act essentially as foreign chemicals in the body. Drug action is at a cellular and molecular level. Our most successful hypotheses, that have led to the discovery of superior drugs, are based upon a knowledge of cellular function and the effects of specific chemicals that modify these functions. Cellular chemistry considers the living cell as a complex colloidal dispersion of fat, protein, nucleic acids, and carbohydrate in water with certain specific ions.

The fine structural organization of this complex is vital to the series of chemical reactions taking place within the cell that maintain the dynamic equilibria we recognize as life. This polyphasic system constitutes the cell and indeed it may be looked upon as a biologic device to convert foodstuffs of a high energy level to a lower energy level. To do this, the cell utilizes oxygen and gives off carbon dioxide. Although the reactions within the cell obey physico-chemical laws, it is important to realize that the basic theme of the life process is regulated by biologic governors, the enzymes and hormones.

The cell and its cytoplasm are constantly undergoing exchange of constituents. These exchange reactions are controlled in large measure by the characteristic protein mosaic of the plasmic membrane of the cell. Cell surface phenomena that regulate, for example, oxidation reactions fundamental to the life of the cell are influenced by many chemical substances that bathe the cell. These may be food chemicals, hormone chemicals, or

essential tissue inorganic elements. It is easy to see how a foreign chemical substance, a poison or a drug, closely related chemically to some cellular constituent, can influence cellular activity.

We have a wealth of information on the nature of the spatial configuration of drug molecules, the significance of isomeric compounds, and the requirements for the molecular geometry that will selectively influence the activity of many cells.

We know about and can identify areas on the cell membrane that are referred to as "active patches." These resemble, in many ways, the active adsorbing centers on charcoal, copper, platinum, and other surfaces used to catalyze the combining of gases and organic reactions in the laboratory. The impinging or adsorption of drug molecules on these "active patches" as prosthetic protoplasmic groups is one of the most plausible explanations for drug actions. Thus, it is possible for a relatively few molecules to influence the entire cell. A small dose of a drug can influence a large number of target cells in the body.

Biochemical Transformation. Living cells, for their part, have a remarkable capacity to modify drug molecules chemically. This is referred to as biochemical transformation and is a normal process usually achieved by enzymes present in the cells of the liver.

Perhaps, one of the most significant developments in biochemistry, genetics and pharmacology in the past 25 years has been the concept of "Selective Toxicity." This idea, which was proposed originally by the Australian investigator, Adrian Albert, is now widely accepted. It will explain not

only the way in which drugs are effective as therapeutic agents, but also the action of toxic chemical substances in the animal organism.

Selective Toxicity is the "injuring" of one kind of living cell without harming another, even though the two kinds of cells are in intimate contact. Selectivity may be achieved through differences in cell morphology or cell biochemistry. For example, the function of a liver cell is fundamentally different from the function of a brain cell or a muscle tissue cell.

We find also that their enzymes are different. Their levels of oxidation and their fine structural organization all are unique. The chemistry of the cell determines its dynamic function and for this reason it is possible selectively to influence function through biochemical selective toxicity.

Liver Metabolism of Chemicals. The evidence is clear that the major site of metabolic change of chemicals introduced into the body is in the liver. This change is brought about by the activity of enzyme systems that are found in certain particles within the liver cells known as the microsomes.

Many researchers have demonstrated that it is possible to produce an adaptation in animals to a chemical by increasing these chemical metabolizing enzymes by repeated administration of the agent.

Further, it is possible to store up as it were, a reserve of enzyme that will protect the body in the future. In addition, the administration of some drugs enhances the ability of the liver microsomes to metabolize other closely related compounds. In some instances, the liver can be made capable of metabolizing chemical substances unrelated chemically to the original enzyme stimulating agent.

Pretreated by the administration of moderate doses of one of the barbiturate drugs, rats will develop an increased activity to metabolize by their liver microsomal enzymes not only other barbiturates, but also aminopyrine, aminoazo dyes and the carcinogen, 3, 4-benzpyrene.

Similar pretreatment with the antihistaminic agent, chlorcyclizine, will increase the activity of enzyme systems that metabolize some barbiturates and the muscle relaxant drug, zoxazolamine. This is a general phenomenon for numerous chemicals and it has been found to occur in many animal species, including man. There are marked differences in strains of animals and great differences in the rate of metabolism of many drugs in some animals and man.

Dr. C. Jelleff Carr joined the staff of the U.S. Army Research Office in June 1963 as chief, Scientific Analysis Branch, Life Sciences Division. Known for about 100 publications on neuro- and psychopharmacology, he recently completed a revision of the sixth edition of *Pharmacologic Principles of Medical Practice*, a widely used textbook coauthored with Dr. John C. Krantz, Jr., and scheduled for publication in January 1965.

Dr. Carr earned B.S. (1933), M.S. (1934), and Ph. D. (1937) degrees in pharmacology from the University of Maryland where he was a research assistant to the chairman, Committee on Inorganic Chemicals of U.S. Pharmacopeia, and an Emerson Fellow in pharmacology. Appointed an instructor at the University in 1935, he became a professor in 1955.

From 1955-57 he served as head of the Department of Pharmacology, Purdue University. In recent years he has been a special lecturer on pharmacological research at George Washington University and visiting professor of pharmacology at the University of Maryland.

From 1957 to 1963 he served with the National Institute of Mental Health (NIMH), National Institutes of Health (NIH), Bethesda, Md. (from 1960 as chief of the NIMH Pharmacology Unit). Recently he was appointed to the Pharmacology Training Committee of the National Institute of General Medical Sciences, NIH, organized to meet the pressing requirements for clinical pharmacologists imposed by recent Federal Food and Drug Regulations.

Dr. Carr's publications date back to reports coauthored on substitute carbohydrates in the diet of man and animals. Later studies explored the effect of little-known sugars or sugar derivatives. He collaborated in inhalation anesthetics research which led to discovery of cyclobutane and cingyl ethyl ether, and resulted in the publication of 45 reports.

Dr. Carr has been recognized for his studies on the toxicology of chemical warfare agents and protective measures for Army Service forces during World War II, and for public service in his native State of Maryland.

Winner of a Frances P. Garvan Scholarship of the American Chemical Society (1929-33), he is a member of the Society of Sigma Xi, honorary member of Kappa Psi, and is affiliated with the American Society for Pharmacology and Experimental Therapeutics, Society for Experimental Biology and Medicine, the American Pharmaceutical Association (Life Member), American Chemical Society, New York Academy of Sciences, Pan American Medical Association, the Albertus Magnus Guild, and is a Fellow of the American College of Neuropsychopharmacology.

Since man is a remarkably heterogeneous species, it is not surprising that, while his metabolic pattern is fixed, the rate of metabolism of a drug varies greatly from person to person. This biologic variation, like size and shape, obviously has a genetic background.

Toxicity of poisons may be enhanced or drug effects may be prolonged by the prior administration of an inhibitor of liver microsomal enzymes. Thus, the toxicity of the insecticide Malathion (S-(1, 2-dicarboethoxyethyl) —O, O-dimethyl phosphorodithioate) is increased by ethyl P-nitrophenyl thionobenzene phosphonate, because the latter agent inhibits the esterases responsible for detoxification of Malathion.

A compound known as SKF 525-A (β -diethylaminoethyl diphenylpropylacetate) will inhibit the metabolism of several drugs and prolong the hypnotic effects of barbiturates. Simi-

lar actions are known for at least six inhibitors of drug metabolizing enzymes.

Fundamentally, changes that take place within the cells of the body represent a form of adaptation. Adaptation to a change in the environment is a basic biologic principle. Bacteria possess enzyme systems that may be latent but capable of utilization for growth and development when the normal culture changes. Evolutionary forces can give rise to populations with marked resistance to hostile environments and very different from the ancestral type.

In the evolutionary chain, the thread of life is ably protected by adaptive systems, including the enzymes, in the higher animals. Genetic differences have been demonstrated in animals and man that apparently control the absorption, metabolism and excretion of drugs and poisons.

(Continued on page 34)



Dr. C. Jelleff Carr

Watertown Arsenal Slated for Elimination in DoD Move

Watertown (Mass.) Arsenal is the major Army research and development activity scheduled for elimination under Secretary of Defense McNamara's economy drive, involving 63 actions and estimated annual savings of \$68 million.

Established in 1860, originally as a depot for the storage and manufacture of small arms, Watertown Arsenal is programmed to phase out by September 1967, as announced by Secretary McNamara. Savings of \$5.3 million will be effected by cutback of 2,889 civilian and 13 military positions, a survey report indicated.

Only the U.S. Army Materials Research Agency and a branch of the Boston Procurement Office will remain at the Arsenal. Other facilities will be declared excess and turned over to the General Services Administration for disposal. It was decided that the workload of manufacturing activities at the Arsenal could not be supported economically after 1967.

Accelerated studies of Defense installations directed by President Johnson in December 1963 led to the decision to consolidate, reduce or discontinue 55 military installations in the United States and eight overseas.

Primary stress is being placed on consolidation of related activities within and among the Military Departments and the Defense Supply Agency (DSA) in order to reduce overhead costs and facilities.

Field contract administration offices will be consolidated in 29 cities where there are now two or more separate offices operated by the Military Departments and DSA. The decision to consolidate these field offices is one result of a study initiated in August 1962 and known as "Project 60."

The organization and procedures of the military services and DSA for supervising the award and performance of contracts were examined. The three military services and DSA, it was found, maintain 150 offices employing more than 20,000 people.

These offices are responsible for performing a large variety of services, including material inspection, quality control, production expediting, payment of contractors, industrial security, property accountability and disposal.

Over the next two years, these activities will be organized as a common support service to all Department of Defense procurement offices as well as to the National Aeronautics and

Space Administration. Consolidation and reduction in overhead staffs are expected to result in annual savings of \$18.8 million.

Secretary McNamara said that the consolidated offices would not include specialized groups such as the construction inspectors of the Army Corps of Engineers and the Navy Bureau of Yards and Docks; the Navy supervisors of shipbuilding; and the plant representatives of the Army, Navy and Air Force who are directly concerned with plant level supervision of prime contracts for major weapon system programs.

When added to other actions announced since 1961, the 63 actions will result, when completed, in 696,000 acres of real estate released for non-defense use; 61 industrial plants with commercial potential made available for sale to American industry; 81,600 personnel positions eliminated; \$551 million in annual operating savings.

Since 1961, the General Services Administration has made substantial progress in the sale of excess Defense installations and has returned \$71.5 million in proceeds to the Treasury.

The latest actions will be phased over periods of up to 3½ years to minimize the impact on employees and communities, as well as to reduce closeout and relocation costs. Career employees whose jobs are eliminated will be offered other job opportunities.

If the new job offered an employee requires a move to another Defense installation, expenses involved will be borne by the Government.

To assure the widest opportunity for new jobs, retraining programs for skills required within the Defense Department will be established when necessary at Government expense.

The services of the Department of Defense Office of Economic Adjustment will be available to help communities find new payrolls.

GIMRADA Cites SECOR Satellite Engineer

The Army Meritorious Civilian Service Award for work as project engineer in the development and launching of a satellite that is providing more accurate geodetic data was presented to John G. Armistead.

Col W. H. Van Atta, director of the U.S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency (GIMRADA), Fort Belvoir, Va., made the presentation at a recent ceremony.

Armistead was cited for development from February 1962 to February 1964 of the satellite containing a

part of a system called SECOR (Sequential Collation of Range) and for management of the launch team.

The satellite, rectangular in shape, measuring only 9 x 11 x 14 inches, and weighing about 40 pounds, contains a radio receiver-transmitter to collect more accurate data for pinpointing relative locations of continents, islands, and other landmarks separated by large bodies of water.

(For a description of the satellite, see May issue, page 16.)

Armistead's citation stated in part: "...As the top technical civilian for GIMRADA, the developing Agency, he was primarily responsible for the successful development of the first ranging system using a cooperative orbiting satellite for the purpose of obtaining worldwide data for geodetic mapping. Operational use of this system will enable the user, Army Map Service, to accomplish its assigned mission for the Corps of Engineers in a more accurate and expeditious manner. His accomplishments reflect great credit to himself, the Corps of Engineers and the Department of the Army."

A 1949 graduate of Hampden-Sydney College, Armistead has been employed at Fort Belvoir since 1951. He studied physics and mathematics at Catholic University, geodesy and astronomy at Georgetown University and physics at George Washington University, all in Washington, D.C.



GIMRADA director Col W. H. Van Atta presents Army Meritorious Civilian Service Award to John G. Armistead for his work in developing of SECOR satellite used for obtaining data for worldwide geodetic mapping.

Second R&D Officer Wins General Marshall Award At General Staff College

The General George C. Marshall Award to the honor graduate of the U.S. Army Command and General Staff College has been won for the second time in two years by a major in the R&D Officer Specialist Program.

Maj Robert J. Kennedy, in research and development assignments in Washington, D.C., for four years and chief of the Military Applications Section of the Nuclear Branch, R&D Directorate, U.S. Army Materiel Command at the time he enrolled in the CGSC course, is the latest winner.

When Maj Kennedy was honored May 8 at CGSC graduation ceremonies at Fort Leavenworth, Kans., he followed in the footsteps of another enrollee in the Army R&D Officer Specialist Program, Lt Col John C. McWhorter.

Promoted to his present rank since then, Lt Col McWhorter was assigned in 1962 with the U.S. Army Research Office, Arlington, Va., and is now with the U.S. Army Standardization Group, United Kingdom, in England.

Consisting of an engraved bronze medallion, the Marshall Award recognizes scholarship in honor of the



CGSC HONOR GRADUATE Maj Robert J. Kennedy (right) receives Marshall Award from Lt Gen Edwin J. Messinger, acting CG of CONARC. At left is Maj Gen Harry J. Lemley, Jr., CO, Command and General Staff College.

late General Marshall, one of America's most distinguished soldiers, *CGSC* honor graduate in 1908.

Maj Kennedy was selected for the award in competition with more than 400 classmates, as was Lt Col McWhorter. That attests to the general high caliber of enrollees in the Army R&D and Atomic Energy career programs—at least that is the firm contention of Lt Col Willis L. Paul, head, Officer Personnel Directorate, Office of Personnel Operations.

The CGSC 18-week associate course is designed to prepare officers for duty as commanders and general staff offi-

cers of combat divisions or logistical commands, and to familiarize them with general staff duties at corps and field army level.

Maj Kennedy, 39, is the son of Mr. and Mrs. J. Dean Kennedy of Mars, Pa. He was graduated from Mars High School in 1943, from the U.S. Military Academy, West Point, N.Y., in 1947, and received his M.S. degree from the University of Virginia.

His next assignment is with the U.S. Army Munitions Command at Fort Halsted, Kent, England.

Infrared Spectrophotometer 'Fingerprints' Chemicals

Robert Clem, a young scientist with the U.S. Army Missile Command, Redstone Arsenal, Ala., is a "fingerprinter" of materials, using an infrared spectrophotometer to determine chemical analysis.

Like fingerprints, no two chemical compounds will present the same picture when they are exposed to infrared radiation. As a chemist in the



Army Missile Command scientist Robert Clem prepares sample for analysis on infrared spectrophotometer.

Materials Analysis Section, Engineering Division of Procurement and Production, Clem's job is to identify faulty materials. The spectrophotometer is as infallible in this task as the fingerprint method is in identifying criminals.

Clem analyzes such compounds as plastics, rubber and liquids to insure that the materials supplied to the Missile Command meet the rigid standards required. The system reduces time involved in analysis of faults and malfunctions from days to minutes. The spectrophotometer yields a graphic presentation which can be compared with a known spectrum already catalogued.

In the case of plastics, for example, a portion of the material is pressed into a thin film and inserted into the machine, where the infrared beam passes through it. If the compound is perfect, it will be identical to the known spectrum.

Clem also is preparing an annotated bibliography of infrared spectroscopy so that Missile Command scientists will have at their fingertips information on problems already solved to facilitate solution of future problems.

Fort Bragg Reports Gains On Special Warfare Center

Construction is continuing at Fort Bragg, N.C., on a multimillion dollar Special Warfare Center designed to get expanding troop units out of old World War II frame buildings.

The new Center area, begun last fall, will consist of a complex of permanent concrete buildings including battalion and company headquarters, offices, barracks, mess buildings, a chapel, classrooms, and other supporting facilities.

It is expected that the Center will be completed by Christmas of 1965. Need for expansion of the facility is evidenced by enrollment increases, from a beginning of 323 men in 1960 to a current strength of 6,000.

The first buildings to be constructed, along with the headquarters building, are three company administration and supply buildings, six enlisted men's barracks, two student bachelor officer quarters, a student officer field mess and two battalion sized mess buildings, a dispensary, chapel, mission staging facility and a central heating plant, which also will provide air cooling.

The 3-story barracks are designed to house two companies or 326 men.

Symposium Reviews Light's Effect on Vision

Research associated with light's effect on vision, such as flash blindness, was reviewed during a May 5 symposium on "Chemistry of Vision" at the Army Materiel Command's Natick (Mass.) Laboratories.

Seventy-five persons representing military research agencies, universities, and industry attended the symposium which was sponsored by the Pioneering Committee, NAS-NRC.

Natick Laboratories have a vital interest in vision studies and eye protection,

particularly as concerned with flash blindness (temporary blindness) caused by eye exposure to bright light.

Allen Kropf, Amherst College, Amherst, Mass., provided a summary of the photochemistry of rhodopsin, the purple-red pigment in the human eye retina rods which is quickly bleached by light and is a night vision asset.

Robert S. Livingston, University of Minnesota, discussed "Flash Photolysis Studies Related to Vision." He is particularly interested in reaction

rates and quantum yields of photo reactions.

John Dowling, Harvard University, considered "Biological and Chemical Processes Related to Vision," particularly short pulses of light.

Alabama Scholars to Aid Missile Command Mission

The U.S. Army Missile Command recently granted the University of Alabama's Research Institute in Huntsville \$103,854 for performance of two research tasks.

The contract provides for "A Study of Detection and Information Processing with Memory-type Decision Circuits," and "Studies of Wave Propagation Through Plasma with Emphasis on Quantum-Physics."

Maj Gen John G. Zierdt, Missile Command CG, said he could not overly stress the importance of the Research Institute in providing research facilities and instruction as an adjunct to complement the Command's graduate training program.

University personnel designated as principal investigators for the research tasks also will teach graduate courses to Missile Command personnel at the Huntsville (Ala.) Center.

"This dual function will serve to strengthen the technical competence of the Missile Command by making available advanced training and will serve additionally to attract and retain desirable personnel," General Zierdt said.

IEEE Microwave Award Won By Army Contract Scientist

Award of the 1963 Institute of Electrical and Electronics Engineers' microwave prize to Dr. Leo Young of Stanford Research Institute makes a proud godfather of the U.S. Army Electronics Command.

The award, given during IEEE's 1964 International Symposium on Microwave Theory and Techniques at Kennedy Airport, N.Y., May 18-21, was made on the basis of Dr. Young's paper: "Direct-Coupled-Cavity Filters for Wide and Narrow Bandwidths."

Dr. Young's work was done under an SRI contract for "Design Criteria for Microwave Filters and Coupling Structures," awarded by the Microwave and Inductive Devices Branch of the U.S. Army Electronics Laboratories, a major directorate of the Electronics Command.

In addition to Dr. Young's work, the contract covers preparation by SRI of a comprehensive, 2-volume handbook: "Design of Microwave Filters Impedance Matching Networks and Coupling Structures." Dr. Young is one of the authors and his prize-winning paper is included.

8-Ton GOER Vehicle 'Undergoes' Troop Tests in Europe



After four years of design and development, the highly mobile 8-ton GOER is being troop tested in Europe this month to determine capabilities from Army tactical and logistical standpoints as well as necessary operation skills and training. Testing to date has included Field exercises at Fort Sill, Okla., Fort Knox, Ky., Alaska and Panama. Engineering testing has been carried out at Aberdeen Proving Grounds, Md. Built by Caterpillar Tractor Co., the GOER incorporates many of the principles of high-speed construction equipment. A liquid-cooled, turbocharged and after-cooled Caterpillar D333 diesel engine provides power for climbing 60 percent grades and maintaining road speeds of 30 m.p.h. (top left). All-wheel drive assures maximum traction (center left). High ground clearance, high approach and departure angles and a low break angle give capability to traverse wet, marshy and rough ground (lower left). Tires propel GOER, with an 18-inch freeboard, fully loaded in inland waters at 3 m.p.h.



Electronics Command Names Key Personnel

Key personnel assignments incident to the reorganization of the U.S. Army Electronics Command set in motion May 1 have been announced by Maj Gen Frank W. Moorman, along with other changes.

Col James M. Kimbrough continues to head the U.S. Army Electronics Laboratories (Research and Development dropped from the former title) at Fort Monmouth, N.J., but is now titled director instead of commanding officer. Col Robert K. Saxe is deputy director rather than deputy CO. William L. Doxey retains his title as technical director of USAEL.

Command Headquarters at Fort Monmouth will have two deputy CGs, both brigadier generals, one for Plans and Programs, the other for Operations. Assignments had not been announced at press time. The Command has an authorized strength of 10,187 civilians and 1,947 military personnel.

Col Charles F. Alfano, who has been director of Procurement and Production in E-Command headquarters, now heads the new P&P Directorate based in the Coles Area at Fort Monmouth. The Directorate is responsible for contracts totaling about \$1 billion annually. The Production and Specification Engineering Department of the Electronics Materiel Support Agency at Coles was made a part of the Directorate.

Leo A. Kapust, formerly director of Industrial Preparedness at the Army Electronics Materiel Agency in Philadelphia, has been designated as acting technical director of the P&P Directorate.

Col John P. McGovern holds his former function but now heads the new Directorate for Materiel Readiness. Joseph G. Melvin carries on substantially the same duties but has a new title as the Directorate's acting technical director.

The new Personnel and Training Directorate, with headquarters at Fort Monmouth, is directed by William D. Roberts, former civilian personnel officer for the Command. Maj Dan Howard is the deputy director.

Col Edward T. McConnell, formerly G-3, 12th Army Corps, Atlanta, Ga., will head the new Electronics Support Command. Col Murray A. Little will remain as director of Installations and Services.

As previously announced by General Moorman, Philadelphia becomes the headquarters and center of activity of the new Materiel Readiness Directorate. Subordinate functions will be carried out at other places.

As an integral part of the operation, a maintenance engineering activity designated a National Maintenance Point remains at Fort Monmouth. This office has been a part of USAEMSA. A National Inventory Control Point (NICP), which has been a part of USAEMA, remains in Philadelphia but becomes part of the new M-R Directorate.

One prime function of Materiel Readiness is to prepare the electronics portion of the Army Materiel Plan. When approved, this plan serves as a Procurement and Production guide for acquisitions that are projected as far as five years ahead.

The National Inventory Control Point, which is P&P's biggest "customer," is Materiel Readiness's focal spot in the task of field supply.

The NICP keeps an up-to-date worldwide inventory of Army electronics items, sees that stocks of standard items are kept at adequate levels, and triggers off replenishments through P&P in time to allow for production and shipment to users.

The needs are vast, with the inventory running to some 225,000 different kinds of items, from the largest to the smallest. Prior to procurement of a new item of equipment, M-R prepares the maintenance support plan, and projects the replacement parts needed by depots and field units.

The activities that have been car-

ried on by Headquarters, Fort Monmouth, and the E-Command staff element for Installations and Services, have been regrouped to form the Electronics Support Command, whose duties include the I&S staff functions. Headquarters are at Fort Monmouth, and a field division will be operated in Philadelphia.

In addition to the new Directorates and the Support Command, staff functions that have been performed in subordinate agencies and activities are being consolidated with the staff offices of E-Command headquarters. These include the functions of the Inspector General and General Counsel, the Information Office, the Small Business Office, and the Management Science and Data Systems Office.

The Patent Activity of the Laboratories is being established as a separate Patent Agency. The Electronics Logistics Research Office, redesignated the ECOM Logistics Research Agency, also is a separate unit.

Other new activities being established as Command facilities are a Computation Agency, under the staff supervision of the Management Science and Data Systems Office, and a Financial Management Agency, under the Comptroller and Director of Programs. Both the management and computation centers will have Philadelphia divisions.

(For detailed information of the new structure of the Electronics Command, see May issue, page 1.)



BRITISH MINISTRY OF AVIATION members take a look at Laser equipment used by the Army Missile Command's Directorate of R&D after a briefing by William Davis, Jr. (lower right) physicist with the Future Missile Systems Division. Others (l. to r.) are Andrew Smart, Frank Scrimshaw, and Colin Baron, all from the Royal Radar Establishment; William Jarvis, Royal Aircraft Establishment; and Francis Reynolds, British Embassy in Washington, D.C.

Rock Island to Manage Fire Control Equipment

Management of fire control equipment for all Army nonmissile systems will be centered in the Rock Island (Ill.) Arsenal, U.S. Army Weapons Command Headquarters, transferred July 1 from Frankford Arsenal.

The change will give Jack W. Morgan, director of Supply and Maintenance, about 80 additional kinds of merchandise and some 15,000 types of repair parts—compounding the current problem of handling many thousands of military materiel items.

Fire control equipment, in this instance, is not that used to put out fires. Involved are the control devices to aim a cannon, mortar, antitank gun or tank gun at a target. Items include computers for heavy artillery, plotting boards, telescopic sights, observation telescopes, binoculars, stop watches, chronometers and compasses.

The transfer of responsibility doesn't involve shifting thousands of pounds of hardware from Frankford to Rock Island. Relatively few records will be physically moved. Until July 1, the data will be transferred from computer tapes at Frankford to computers at AWC. After the mission is formally transferred, the original operating records will be used to manage the equipment.

The assumption of the fire control

mission by AWC is only one aspect of the changes in the Army's supply and maintenance system announced Dec. 12, 1963 by then Secretary of the Army Cyrus W. Vance. The Army is eliminating its middle management layers and combining tasks.

About 185 fire control employees will be physically located at Frankford under AWC supervision. This part of the AWC mission will be primarily repair, purchasing and maintenance engineering. Maintenance engineering will keep the fire control instruments as uncomplicated as possible.

Director Morgan will be in direct contact with his personnel at Frankford, as he will be with the 125 personnel occupying the new fire control mission spaces at AWC. Personnel at AWC headquarters will insure that fire control equipment goes to the troops when and where it should.

Supply and Maintenance personnel will not physically handle the fire control equipment. They will insure that the Army depot personnel—the hardware handlers—have enough of each item on hand to satisfy users.

In January 1962, the directorate started screening commercial tools and shop equipment for potential Army use. When AWC was born in August 1962, Supply and Maintenance was recreated with all the old jobs and the added duties of supply and



Supply and Maintenance director Jack W. Morgan (left) and his special assistant, Anthony Slawewski, discuss details of Army Weapons Command's new fire control mission assignment.

maintenance of Army tanks, self-propelled guns and armored personnel carriers.

In January 1964, it added responsibility for supporting maintenance programs all over the world wherever AWC combat vehicles or weapons are located. When the directorate assumes the fire control mission, it will assume some of the jobs formerly done by overseas supply agencies.

By adding the fire control mission to their other tasks, Supply and Maintenance personnel will be fulfilling Army Weapons Command's motto of "weapons for the fighting soldier"—making sure sighting equipment is of high quality equal to weapons.

WRAMC Sponsors Seven Courses At Dental Post-Graduate Level

The U.S. Army Institute of Dental Research at Walter Reed Army Medical Center, Washington, D.C., will offer seven post-graduate short courses this fall and during the first half of 1965.

Subjects and the scheduled dates are Trends in Dental Laboratory Activities, Oct. 26-30; Preventive Dentistry, Nov. 16-20; Prosthodontics, Nov. 7-11; Oral Surgery, Jan. 11-15; Advanced Pathology of the Oral Regions, Mar. 8-12; Oral Diagnosis and Therapeutics, May 3-7; and Principles of Military Dental Research, May 10-14. The latter course is being offered for the first time, while the others are standard.

Attendance is open to the Dental Corps, officers of the Federal Service on active duty and Reserve and National Guard Officers not on active duty and qualified civilians. Officers on active duty must have at least six months remaining to serve in order to be considered for inservice courses.

For further details write to: Director, U.S. Army Institute of Dental Research, Walter Reed Army Medical Center, Washington, D.C.

SCIENTIFIC CALENDAR

International Data Processing Conference, sponsored by the Data Processing Management Association, New Orleans, La., June 23-26.

5th Joint Automatic Control Conference, sponsored by IEEE, American Society of Mechanical Engineers, American Institute of Chemical Engineers, and Instrument Society of America, Stanford, Calif., June 24-26.

General Assembly of the International Association of Mass-Communication Research, Vienna, Austria, June 24-27.

International Symposium on Fundamental Phenomena in Hypersonic Flow, sponsored by Cornell Aeronautical Laboratory, Buffalo, N.Y., June 25-26.

Summer Meeting of American Physical Society, Denver, Colo., June 25-27.

14th Session of Scientific Committee on Effects of Atomic Radiation, sponsored by UN, N.Y.C., June 22-July 3.

Aerospace Reliability and Maintainability Meeting, sponsored by American Institute of Aeronautics and Astronautics, Society of Automotive Engineers and American Society of Mechanical Engineers, Washington, D.C., June 29-July 1.

Spectrometer Conference, Frankfurt Am Main, Germany, June 29-July 2.

Joint Meeting of International Union of Pure and Applied Physics and International Congress on Nuclear Physics, Paris, France, July 2-8.

20th International Geographical Congress, London, England, July 6-11.

International Congress on the Physics of Non-Crystalline Solids, sponsored by the Netherlands Physical Society and International Union of Pure and Applied Physics, Delft, Netherlands, July 6-10.

International Symposium on Magnetohydrodynamic Electrical Power, sponsored by the European Nuclear Energy Agency, Paris, France, July 6-10.

20th International Geographic Congress, sponsored by the Royal Geographic Society, London, England, July 10-Aug. 7.

Annual General Meeting of the Society of Chemical Industry, Manchester, England, July 13-17.

2nd Session of Working Party of Telecommunication Experts, sponsored by UN and Economic Commission for Asia and the Far East, Bangkok, Thailand, July 13-20.

4th International Symposium on Rarefied Gas Dynamics, sponsored by the Institute of Aerophysics, Toronto, Canada, July 14-17.

15th General Assembly of the International Union of Biological Sciences, Prague, Czechoslovakia, July 15-19.

International Conference on Physics of Semiconductors, sponsored by International Union of Pure and Applied Physics, Paris, France, July 20-24.

11th General Assembly and 20th International Congress of International Geographical Union, London, England, July 21-28.

6th International Congress of Biochemistry, sponsored by International Union of Biochemistry, N.Y.C., July 26-Aug. 1.

4th International Congress of International Commission of Photobiology, Oxford, England, July 27-30.

Symposium on Transport Geography, sponsored by the International Geographical Union, Birmingham, Liverpool and York, England, July 28-Aug. 4.

3rd Meeting of International Society for Human and Animal Mycology, Edinburgh, Scotland, July 30-Aug. 1.

Lamanna Speaks at ATCC Dedication

Dr. Carl Lamanna, chief of the Life Sciences Division, U.S. Army Research Office, gave the opening address at dedication ceremonies for the \$1 million new headquarters of the American Type Culture Collection, May 1-2.

Approximately 400 leading bacteriologists attended the dedication ceremonies for the new building at 12301 Parklawn Drive, Rocklawn, Md., featured by an address by Dr. C. M. MacLeod, Office of Science and Technology, Executive Office of the President.

Dr. Lamanna spoke as chairman of the Board of Trustees of the American Type Culture Collection. The introductory technical presentation by Dr. E. G. Simmons, U.S. Army Natick (Mass.) Laboratories, was on "The Theoretical Basis for the Classification of Microorganisms."

Dr. R. E. Buchanan of Iowa State University discussed "History and Development of the American Type

Culture Collection" as the banquet speaker.

Other leading speakers included S. T. Cowan, Central Public Health Laboratories; R. J. Huebner and R. L. Thompson, National Institutes of Health; C. B. van Neil, Hopkins Marine Station; W. F. Scherer, Cornell University Medical College; P. S. Moorhead, The Wistar Institute; C. S. Stulberg, Child Research Center of Michigan; and R. D. Coghill, chairman, American Type Culture Collection Building Commission.

The ATCC recently listed some

4,200 bacterial strains, all but 300 of which are preserved solely in the lyophilized state. About 8,000 cultures of bacteria are being distributed annually. The fungus collection includes about 3,000 strains, and about 5,000 cultures a year are distributed.

The plant virus registry contains more than 160 strains, all supplied individually by contributors. Collections are maintained of more than 200 bacteriophage strains and of viral and rickettsial strains. The ATCC also has been designated as the repository and sole distribution center for the cell line registry of the Cell Culture Collection Committee.

Contractors Competing on AADS-70s Development

Two contractor teams selected by the Army will conduct competitive component development programs on the proposed Army Air Defense Systems for the 1970s (AADS-70s).

New development effort will be on specific components in critical tech-

nical areas, with sufficient system engineering to provide a basis and direction for the effort. Contracts will fund work over a 15-month period.

Competitive development is on high-risk items intended for use in a new weapon system designed for selective replacement of the existing Hawk and Hercules air defense systems. Decision whether to initiate the development of a new system is pending.

The teams are headed by R.C.A., Moorestown, N.J., and Hughes Aircraft Co., Fullerton, Calif. With Hughes are Douglas Aircraft Co., Charlotte, N.C., and FMC Corp., Charleston, W.Va. With RCA is Beech Aircraft Co., Wichita, Kans.

Current effort at the Army Missile Command is under the direction of the Research and Development Directorate. Contract administration is under the direction of the Procurement and Production Directorate of the Missile Command.

90 Shock Tube Research Leaders Convene at AROD

An International Symposium on Chemical Reactions in Shock Tubes held recently at the U.S. Army Research Office-Durham (N.C.) attracted 90 leading research chemists from the U.S. and four foreign countries.

Shock tubes are beginning to fulfill predictions of their potentialities for complex studies and will constitute the means of conducting high-temperature research on many chemical reactions, technical presentations indicated.

Development of supersonic missiles and aircraft has prompted tremendous interest and research in supersonic aerodynamics, resulting in numerous publications on fluid properties of gases at high velocities and on shock phenomena in general as applied to investigating molecular properties.

One of the 22 contributed papers included a report on research at Princeton University's Frick Chemical Laboratory by Dr. Donald F. Hornig. Dr. A. P. Modica presented the paper on behalf of Dr. Hornig, now the Special Assistant to the President for Science and Technology.

Current research is looking at the reaction of more complex chemicals, such as gasoline, and this trend carries with it the need for sophisticated and expensive instruments such as mass spectrometers and oscilloscopes, to be connected to the shock tubes for purposes of data collection.

The new look in shock tube research places chemists under a burden of becoming knowledgeable in the field of fluid mechanics, it was stated, since this type of research involves a combination of fluid mechanics and chemistry.

Detonation waves in gases, usually undesirable and destructive, are being probed in detail via shock tubes. This work may yield knowledge that will make it possible to control these waves.

Dr. David R. Squire, chief, Physical Chemistry Branch, AROD Chemistry Division, was symposium chairman.



INTERNATIONAL REPRESENTATIVES at AROD symposium on Chemical Reaction in Shock Tubes include (l. to r.) Dr. S. H. Bauer, Cornell University; Dr. H. G. Wagner, University of Goettingen, Germany; Dr. D. R. Squire, AROD, chairman of the symposium; Dr. J. N. Bradley, University of Liverpool, England; and Dr. H. Miyama Toyo, Rayon Co., Kamakura, Japan.

Briefing Links Research to Advances in Weapons

Research advances responsible for major progress in new weapons development at Watervliet (N.Y.) Arsenal were discussed in a recent briefing of Army Research Office chemistry and materials personnel.

Dr. Robert E. Weigle, Arsenal chief scientist, explained how methods of predicting the fatigue of thread components in breechblocks for cannons, originated in research started 10 to 15 years earlier, led to development of the 155 mm. self-propelled howitzer and other artillery.

Knowledge gained in investigating causes of breechblock ruptures, including consideration of new methods of material processing and alloys as well as new principles of design, resulted in greatly reduced maintenance problems and in much lighter, more rugged and reliable weapons.

Techniques acquired during the research permit evaluation of prototype components of weapon systems. The dynamic test equipment developed at the Arsenal is believed unique in the Free World. In the case of the 155 mm. howitzer, it made possible a saving in test procedures of at least \$13.6 million, Dr. Weigle reported.

Using the ultramodern testing methods, he said, it is possible to substantially reduce developmental time

on new weapons because prototypes can be evaluated at an early stage, thereby permitting timely redesign and resultant economies. For example, simulated impact fatigue tests of the breechblocks of weapons can exert pressures of 2.5 million pounds in three milliseconds.

Early detection of faults through the testing program and subsequent

redesign prior to field tests, he said, produced a howitzer that increased the rupture life of breech mechanisms from 800 to more than 7,500 firings.

Dr. Weigle also reported on the weapons testing program at Watervliet in a recent article published in "Experimental Mechanics," national journal of the Society for Experimental Stress Analysis. A supporting article in the same edition was written by R. Vincent Milligan of his staff.

Laser 'Giant' Pulses Extend Army Research Horizons

Extremely intense "giant" pulses of Laser light beams, having potential application for optical radar, nonlinear optics and high-speed photography, have been produced in a device developed by Army contract.

Research on phthalocyanine cells used in the new technique was supported in part by the U.S. Army Research Office-Durham (N.C.) under a project designated "Study of Optical Masers." The principal investigators are Dr. P. P. Sorokin and Dr. John Axe of the International Business Machines Corp.

The technique exploits a small cell containing a solution of one of several metal-organic compounds called phthalocyanines, placed between the end of the ruby Laser and one of its reflecting end mirrors.

Initially, the strongly absorbent cell prevents Laser action until the coherent action bleaches the phthalocyanine solution to an almost completely transparent state. The result is a sudden release of the stored energy in the ruby crystal, after which the

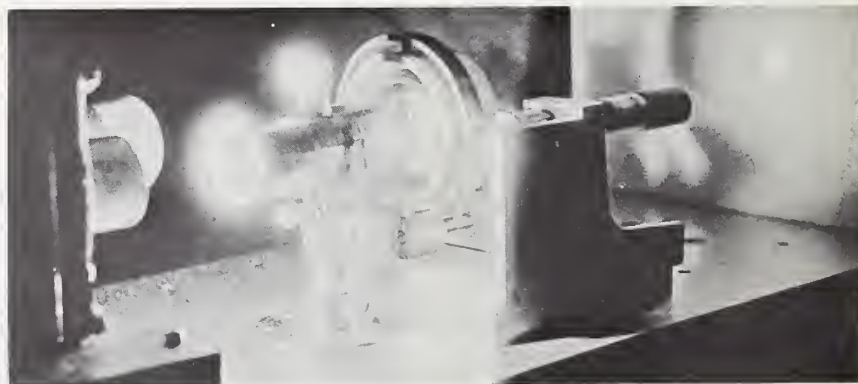
solution returns to its absorbent state for a repetition of the cycle.

The Army Research Office-Durham was a forerunner in supporting Laser research during the pioneering developmental stage. Dr. Herman Robl, AROD deputy chief scientist, commented on the latest achievement:

"We are proud of the fact that support of research pertaining to light amplification by stimulated emission of radiation (Laser) was recommended by this office before the feasibility of Lasers was actually demonstrated.

"As early as July 1960, we predicted the characteristic properties of coherent light sources, and considered Army applications which are now in the development or hardware stage."

The new technique is simple compared to previous methods of producing giant pulses of Laser light by such devices as rapidly rotating mirrors or Kerr cells. The older method requires substantial amounts of auxiliary equipment which is relatively complicated and cumbersome.



SIMPLICITY of new technique for producing "giant" pulses from ruby Laser is shown in picture above. The ruby crystal and flash lamp are in box at left. A mirror completes the Laser cavity. Between the ruby and mirror is a cylinder, with windows at both ends, containing a metal phthalocyanine solution. Solution absorbs ruby light strongly, initially preventing Laser oscillation. When ruby's emission exceeds a certain level, the solution "bleaches," permitting stored energy to be emitted in a giant pulse. The spot of light on the screen, far right, was produced by a giant pulse lasting less than 20 nanoseconds.

Tests Designed to Extend Life of Heat Exchangers

Comparative life expectancies of various aluminum heat exchanger constructions and coatings are being tested at Fort Sherman, Canal Zone.

Under the supervision of the U.S. Army Research and Development Office, Panama, preliminary tests were conducted by John L. McDonald, supervisory mechanical engineer, U.S. Army Engineer Research and Development Laboratories (USAERDL), Fort Belvoir, Va.

A test console, consisting of 12 heat exchanger cores, fans for drawing air through the cores, and pressure gauges, were placed in operation Mar. 10, 1964. Zinc chromate, complete iridite, iridite air side clad only and chromic anodize coatings are represented by the various cores.

The test will continue for a 2-year period and is expected to provide data which will enable USAERDL to determine why present air conditioning cores fail so rapidly in the tropics, and to suggest new techniques for future core construction.



Kenneth E. Woodward, supervisory mechanical engineer at the Army Materiel Command Harry Diamond Laboratories, is the 1964 winner of the Technical Achievement Award of the Washington, D. C. Section of the American Society of Mechanical Engineers.

As one of the five persons honored at the Chapter's recent annual banquet, he received the award for distinguished work on the Army's artificial heart pump.

(For details of early development of the heart pump, which is controlled by fluid amplification principles and has no moving parts except artificial ventricles and tricuspid heart valves, see feature article, page 18, April 1962 issue of this publication.)

THOMAS M. WALLEN, dispatch chief of Transportation Motor Pool, U. S. Army Electronic Proving Ground, Fort Huachuca, Ariz., received a Department of the Army Certificate of Commendation and a check for \$525 for a suggestion saving the Government \$10,950 annually.

The presentation was made by Col John R. Magnusson, post chief of staff, during informal ceremonies May 4. Wallen's suggestion was in the form of a re-scheduling and consolidation of the post bus service.

THEODORIC B. EDWARDS, U. S. Army Engineer Research and Development Laboratories, (USAERDL), Fort Belvoir, Va., received \$100 from the Army in recognition of his patent awarded for an inflatable wheel pontoon.

GEORGE GORNAK and MANFRED GALE won initial awards for \$50 each for filing applications for a patent on a "capacitor discharge blasting machine," and for a "passive perimeter intrusion detection system."

Col J. H. Kerkering, CO of the Laboratories, presented the awards including: \$50 "Special Act and Service Award" to Vincent J. Bagdon, who authored an article, "The Copper-Formate Process for Preserving Textiles and Wood," published in *Developments in Industrial Microbiology*.

Army suggestion award certificates accompanied by \$25 checks were presented to: WATSON C. GREGG, USAERDL, who suggested modification of an existing form that will enable the Engineering Department to

maintain a closer check on family type or related items of engineer equipment for purposes of procurement, manufacture, redesign or revision;

WILLIAM J. BALOUGH, USAERDL, who suggested an index system for all patterns filed in the Model Shop, resulting in a saving of project engineers' time and eliminating the need for making another pattern when one is available.

Other USAERDL awards were for work performance. Mrs. Eveyln R. Stinnett received an Outstanding Performance Rating (OPR) and a Quality Salary Increase (QSI) in recognition of her work as a clerk in the Combat Research Branch. Daniel F. McCafferty, an administrative officer in the Military Department, Oscar L. Owen, an equipment specialist in the Engine Branch, and Benton T. Boogher, Jr., a photographer in the Pictorial Sciences Branch, were given QSI awards.

LT COL KATHERINE R. JUMP, Army Nurse Corps, operating room supervisor at Walter Reed General Hospital, Washington, D. C., received the AMITA Award May 16 at the annual fund-raising dinner at the Biltmore Hotel in New York City. AMITA stands for American Italian Awards Inc., which presents 12 awards annually to American-born women of Italian descent who have distinguished themselves in their chosen field.

Col Jump earned her RN training from the Wyoming Valley Homeopathic Hospital School of Nursing at Wilkes-Barre, was commissioned a second lieutenant in May 1941. Arriving in Hawaii just 10 days after the bombing of Pearl Harbor, she remained in the Pacific area throughout World War II, and later served as chief nurse of the 4th Field Hospital in the Korean conflict.

She since has served in Army hospitals in Germany, Fort Dix, N. J., Valley Forge, Pa., and Brooke Army Medical Center, Fort Sam Houston, Tex. She came to Walter Reed in 1960.

Checks for \$150 each were presented recently to two employees at the U. S. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency (GIMRADA), Fort Belvoir, Va. Col W. H. Van Atta, director, made the Special Act or Service Awards to Stephen W. Gibson and Clifford J. Crandall.

Employed in the Graphics Division, Gibson was recognized for an article, "Goals in Rapid Reproduction Methods," published in the 1963 Proceedings of the Technical Association of

the Graphic Arts. Crandall's award also was for an article, "Advanced Radar Map Compilation Equipment," published in *Photogrammetric Engineering*.

Walter E. Boge of GIMRADA received a \$50 check for an article on "Upper Atmospheric Wind Determinations from Stereo-Photograph of Rocket Vapor Trails," published in *Photogrammetric Engineering*.

Col Van Atta also presented an OPI certificate to Howard O. McComas in recognition of his work in the Strategic Systems Division and a QSI award to Lewis A. Dixon, Research and Analysis Division.

Capt Harold M. Price was presented a letter of appreciation recently for his work as chief of the Director's Laboratory at the Armed Forces Institute of Pathology, Washington, D. C., since 1962.

In presenting the award, AFIP Director Brig Gen Joe M. Blumberg told Capt Price: "By being the possessor of uncompromising professional standards, and working as only a perfectionist would, scientific work that you have carried out to completion is not only satisfying to you but to me and all members of the staff and of course to the many professional people who will read the final published works."

A native of Los Angeles, Capt Price was called to active duty at AFIP May 4, 1962. He recently accepted a commission in the Regular Army and will be stationed as a resident at Walter Reed Army Medical Center, Washington, D. C.



FOXHOLE DIGGER—This 1-pound cannister containing two explosive charges with fuses is the Army's experimental Foxhole Digging Aid. It is composed of a shaped charge that loosens dirt and a second charge that digs the foxhole. It was developed by the Engineer R&D Laboratories at Fort Belvoir, Va. and the Army Aluminum Co. at Torrance, Calif.

Irradiated Foods Prove Acceptable in Series of Troop Tests

Irradiated ham and radiation pasteurized fresh haddock were rated acceptable by troops in garrison mess-hall tests, a recent fact sheet from the Army Research Office states.

The report stated that since July 1, 1963, over 3,400 meals of the irradiated foods were served to troops at Fort Lee, Va., to determine their preference of radiation sterilized bacon, pork and chicken in comparison with fresh products.

All irradiated foods tested had been stored at room temperature from 3 to 11 months. The experimental ham and haddock were rated "high enough for them to be considered acceptable as components of standard meals."

Prior knowledge that irradiated food items were being served had no effect on the troop preference ratings. The ham had been stored at room temperature for nine months while the haddock had been stored at 32° F. for 15 to 29 days.

In conformance with the requirements of The Surgeon General, all irradiated foods are certified free of induced activity and in every respect safe for human consumption prior to troop testing.

Army plans call for continued troop feeding tests on specific meats, fruits, and vegetables to determine their acceptability to troops, and also to obtain information on possible monotony factors associated with repeated use of irradiated food. A series of tests was scheduled for early this month.

The fact sheet noted that the research program on irradiated foods is being conducted to meet the Army's requirement to decrease food losses through spoilage, to simplify food storage and distribution by reducing refrigeration requirements, and to provide the Armed Forces with more acceptable ration components.

Objectives of the tests are to determine: 1) consumer preference for the irradiated food when served as part of the normal meals under garrison feeding conditions; 2) effects on personnel of repeated consumption of irradiated food; 3) effects of prior knowledge that irradiated foods are being tested on consumer preference.

Once tests are completed to the satisfaction of scientists at the U.S. Army Natick (Mass.) Laboratories, where investigations of irradiated food processing have continued since 1953, data on the research and the Fort Lee tests are submitted for approval to the U.S. Food and Drug Administration (FDA).

After evaluating the data, the FDA

then determines whether the foods shall be approved for public consumption. To date, only bacon and grains for flour have been FDA endorsed.

Other foods which have been submitted to FDA are potatoes irradiated to inhibit sprouting and, jointly with the Atomic Energy Commission, oranges and lemons treated to extend shelf life.

Irradiated chicken, subjected to many recent tests, was served to troops at least once a week over a period of a month to determine whether repeated consumption had any effect on consumer preference.

Oven fried, Southern fried, and in-barbecue-sauce sterilized chicken which had been held at room temperature for four months were evaluated under garrison messhall feeding conditions. Similar products prepared from fresh chickens were served as comparison controls.

Results indicated that preference ratings for irradiated chicken and standard chicken are not significantly affected by the repeated consumption of these items once a week over a period of a month.

Chicken and fruit compote have not been sent in to the FDA but are next in line for submission. Other irradiated food under test are pork, beef, shrimp, codfish, tuna fish, carrots,

green beans, cabbage and peaches.

FDA clearance of a food item does not mean it will be immediately introduced into the standard Army rations or that it will be offered commercially in the near future.

Irradiated bacon comes out of the can in a state practically indistinguishable from so-called raw bacon and is ready for frying in the normal manner. Its advantage over nonirradiated bacon is that it will keep at room temperature.

FDA approval of bacon last year required that it be irradiated with a 4.5 megarad dose of gamma rays from a cobalt 60 source and packed in tin cans. Metal containers are being used to package other test foods but research scientists are also attempting to develop flexible packaging materials such as plastics.

Principal problems of the development program are determining the exact amount of radiation which can be used and containers which will extend shelf life the longest and insure minimum effect on normal taste, odor and appearance.

Over the past 11 years, the U.S. Army's food irradiation research program has involved active participation of more than 70 industrial firms, 40 universities, 10 nonprofit organizations and major Federal agencies.

Army Tool Design Expert Speaks at ASTME Meeting

One of the U.S. Army's leading experts on design and manufacture of tools, Richard W. Colburn of the Springfield (Mass.) Armory staff, was a featured speaker at the recent annual ASTME meeting in Detroit.

As supervisor of Manufacturing Development at Springfield Armory, Colburn gave a key address to the American Society of Tool and Manufacturing Engineers annual conference and tool exposition. His topic

was "Numerical Control and/or Manually Programmed Control."

Originator of the term "Manually Programmed Control," he has gained national recognition in development and application of numerically controlled machine tools. The term has found favor among other engineers.

Colburn is a veteran of more than 20 years Federal service with the Armory and has supervised manufacturing development activities at the U.S. Army Weapons Command installation since 1957.

Among accomplishments for which he is credited by Armory leaders are perfecting and applying new fabrication technology for modern concepts of precision gun drilling; also, electrodischarge, electrochemical and numerically controlled machining as applied to prototype pilot fabrication of small arms and aircraft weapon system component items.

Currently he is a member of the editorial board for the 8th Edition of Metals Handbook, American Society for Metals; and many technical groups, including "Numerical Control Central Planning Committee" and "Metal Cutting Advisory Committee."



Richard W. Colburn

Rocketeer 'Rock Hound' Theorizes on Demosthenes

For centuries people have thought Demosthenes, the patron saint of after dinner speakers, carried a clutch of pebbles in his mouth to develop pear-shaped tones in his oratory.

But R. P. Watts of the Army Missile Command Nike X Project Office at Redstone Arsenal, Ala., may have cast new light on the old theory. Instead of improving his elocution, the glib Greek may have been one of the earliest recorded "rock hounds."

A rock hound is a person who rambles wood, field, riverbank and mountaintop with downcast eyes. Armed with a geologist's hammer, a knapsack, a magnifying glass and a strong determination to leave no stone unturned, he collects interesting rocks and pebbles like a leaky rowboat collects water.

When he spots a curious pebble that defies immediate identification, he may pop it into his mouth for further exploration by tongue.

According to Watts, "a rock hound's tongue is second only to his eyes in ability to identify strange rocks." The human tongue can identify the sharp edges of a crystal better than fingers can, and a drop of saliva on the rough polished surface of a rock makes its internal markings stand out like bullet holes in a plate glass window.

Watts has some 250 different kinds of rocks and, in a strange way, his hobby is related to his profession. A missile engineer, he is chief of a branch which develops auxiliary equipment for the Nike X ICBM defense missile system. In this role he works on the world's newest missiles and rocks are, of course, the world's oldest.

He is also a past president of the Huntsville Gem and Mineral Society.

Watts has literally a house-full of rocks, ranging from huge pieces of petrified tree trunk to a single tiny diamond he picked up while "panning" soil in Arkansas. They overflow big glass display cases and spill over into some 350 labeled and cataloged cigar boxes.

Among the oddities are lava from

MIDDLE AGE. It has been stated that Middle Age is the time of life when your idea of getting ahead is to stay even.

THE ONE-TWO PUNCH. It has been said that: A good leader not only remembers to bring home the bacon but also the applesauce.



ODDITY in rock collection gathered by R. P. Watts as a hobby, this piece of sandstone doesn't seem to realize it ought to be strong, rigid and hard—as a rock. Held by its two ends, it sags under its own weight, can easily be bent, twisted, flexed like cardboard.

the North Pole, coral from inland Tennessee and a strange slab of so-called sand rock from Georgia that bends like a piece of cardboard.

U.S. Army Combat Surveillance School CO Retires

Col Roy A. Murray, commandant, U.S. Army Combat Surveillance School at Fort Huachuca, Ariz., since September 1962, retired Apr. 30 after nearly 31 years service. His successor is Lt Col Harold F. Via.

Col Murray was awarded the Legion of Merit by Maj Gen Benjamin H. Pochyla, post commander, for meritorious achievements.

Earlier the same week both Col Murray and his wife Donny received individual citations in recognition of local community service achievements since their arrival at Fort Huachuca in 1962. General Pochyla presented the citations.

The Legion of Merit Citation said that Col Murray had contributed materially to the success of the Continental Army Command's surveillance and target acquisition mission and to the defense effort of his country.

As commander of Company F, 1st Ranger Battalion, then Capt Murray was one of the first Americans on European soil in World War II, leading his company in the famous Dieppe Raid in France in August 1942.

He commanded the 32nd Infantry Regiment in Korea and later served there as Deputy Chief of Staff, I

In time he has provided specimens for the Smithsonian Institution and the American Museum of Natural History in New York City. His rock collecting tours have taken him over much of the United States and even out of the country. He has scoured the deserts of the American southwest and once picked up an uncut topaz on the streets of New York.

A part of his staggering collection—which may be the biggest private one in the South—consists of thousands of agates. Like fingerprints, no two of them are alike.

He also has star sapphires, rubies, aquamarines and garnets by the score. His valuable rocks he keeps in a bank vault until he feels he has become proficient enough at the lapidary wheel to cut them himself. Trying to get any more information about these stones from Watts is like—well, like drawing blood from a boulder.

Nearly all of his stone-cutting equipment—saws, grinding wheels and the like, including scales that can measure down to two/one hundredths of a carat—he made himself.

On his desk he keeps an ashtray of lava and his tie is held in place, naturally, by a rock tie clip. His favorite TV program? You guessed it, the Flintstones.

Corps. Prior to his assignment at Fort Huachuca, he was deputy commander and chief of staff of the U.S. Army Berlin Brigade and deputy commander of the Northern Area Command at Frankfurt.

In addition to the Legion of Merit, the colonel has earned the Silver Star, Bronze Star with combat "V" and Ethiopia's Emperor Minilik II Medal.



Col and Mrs. Roy Murray pose with Maj Gen Benjamin H. Pochyla, CG of USAEPG, Fort Huachuca, during informal ceremonies at which they received Certificates of Appreciation for community services at Fort Huachuca.

Army Mapping Services Prepares for Astronauts' Moon Landing

When the first American astronauts land on the moon in about five years, they will be carrying maps of the visible lunar surface almost as accurate as many good maps of the earth.

Although there are no man-made landmarks on the moon, and compasses will not work there because of the absence of magnetic fields, astronauts should be able to find their way with little difficulty.

The heights of mountains, the widths and depths of craters, surface colors and gradations, and certain features accurately portrayed on new maps are already being studied by U.S. astronauts.

In early 1964, the U.S. Army Map Service of the Corps of Engineers published the first accurate topographic map of the visible surface of the moon, which was compiled by precise stereophotogrammetric mapping techniques. At a scale of one to five million (one unit on the map represents five million units on the moon), the map shows heights in meters of craters, mountains, and flat areas.

The base point for all horizontal and vertical measurements is the floor of crater Misting A, which is near the center of the moon's visible face. Mapmakers assigned the height of seven kilometers to the bottom of the crater, then referred all other elevations to it.

For example, towering Mount Huygene is 11.9 kilometers in height. The crater Galilaei is 2.5 kilometers and its rim rises to 5.3 kilometers—the latter is 1.7 kilometers below the floor of Misting A.

Because no apparent bodies of water exist on the moon's surface to



LUNAR MAP prepared by U.S. Army Map Service, Corps of Engineers, at a scale of 1:5,000,000.

be used as such a reference, there are no "zero" elevations or mean sea level as on earth.

Mare Tranquillitatis, where Ranger 6 spacecraft crash-landed in January 1964, varies in elevation from about 4 to 8.7 kilometers. This "mare" or dry "sea" averages 7 kilometers in elevation.

The moon map also duplicates the colors of the lunar surface, from the light colors of the ray system to dark slate colors of the "seas."

U.S. mapmakers spent years working with data which astronauts had spent lifetimes gathering in the United States and Europe. The mappers pored over thousands of lunar photographs taken through large telescopes.

Eight pairs of photos from the Paris Observatory were selected as best for their measuring purposes. Taken between 1896 and 1907, the pictures are on the scale of one to 22 million. For interpretation purposes, photos from the Pic du Midi and American observatories were used.

Photography of the moon was started by Bond and Draper in the United States in about 1850. The turn of the century saw lunar photography at its peak in quantity and quality. After that, astronomers, with their new sophisticated telescopes, turned to the planets and stars. Topographic mapping was made possible because of "vibrations" or "wobbles" of the moon, enabling earth viewers to see about 59 percent of its surface.

The mapmakers painstakingly listed more than 5,000 crater and surface features by latitude and longitude, and printed them on the back of the map. They had to make millions

of calculations on electronic computers to determine precise locations and heights.

The scope of their work can be appreciated by comparing the face of the moon—some 8.6 million square miles (22.3 million square kilometers—with the land area of North America, 9 million square miles (23.3 million square kilometers)).

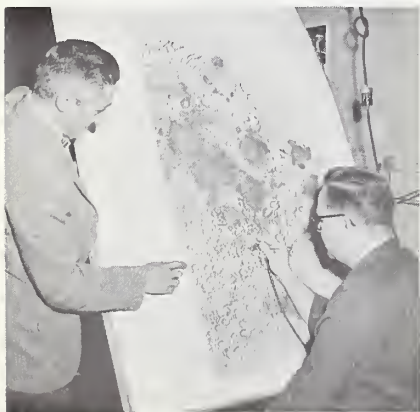
The mapmakers faced other limitations; the distance from the moon to earth averages 239,000 miles (385,000 kilometers) and photographs of the moon taken from earth-based telescopes are only 6 or 7 inches in diameter.

The coming years are expected to see a revival of interest in the moon for two main reasons. First, astronauts are planning to land on the lunar surface by the end of this decade. Second, cameras and telescopes are now being taken above the earth's atmosphere in balloons and rockets, in hopes of obtaining better pictures for interpretation purposes.

Spacecraft equipped with television cameras will radio pictures of the moon back to earth later in 1964. However, TV photos are not adequate enough for accurate measurements.

Photographic spacecraft are planned to orbit the moon, take pictures, and return to earth with exposed film valuable for making detailed maps of both the face and the back of the moon. The goal of the Army Map Service is a series of topographic maps of landing areas for astronauts, at scales of one to 25,000 or larger, and smaller scales of the rest of the moon.

However, space travelers will require much training in the proper



Felix Bizzoco, former chief of Adjustment and Tests Branch, checks progress of Maurice L. Curtis, Pictorial Arts Section, air brushing a map.



Robert M. Petty, Adjustments and Test Branch, operates precision condenser enlarger to provide photographs used in producing lunar maps.

use of lunar maps, particularly during flight over the surface.

One of their biggest problems will be to identify natural features such as small craters under varying conditions of visibility. A crater will appear one way with the sun overhead, but will look entirely different at sunrise and sunset. Harsh black shadows on the moon are unlike earth shadows, which are modified by the atmosphere.

The Army Map Service is able to simulate these appearances by shining lights from different angles on 3-dimensional lunar models constructed on a curved datum.

Astronauts will be able to use a let-down simulator located at the Langley (Va.) Research Center of the National Aeronautics and Space Administration. These consist of a 20-foot (6.56 meters) sphere and moon map sections measuring 40 by 15 feet (13 by 4.9 meters).

Maps carried to the moon by astronauts will probably be made of special material to withstand the temperature extremes on the lunar surface, from about 214° F. to about -250° F. (above 101° C. to about -157° C.).

Therefore, the Army mapmakers are experimenting with 3-dimensional maps made of hard and soft plastics and rubber compounds. Some can be folded into a pocket.

Since the moon's diameter is only one-fourth that of the earth, the observed lunar horizon appears much closer than that of the earth. An astronaut walking along a flat area of the moon would lose sight of a

fellow astronaut after going only about one mile (1.6 kilometers). Therefore, he would have to chart his course carefully on his map.

Before the astronauts ever land their 2-man Lunar Excursion Module (LEM) from their large Apollo spacecraft, they will have to study many possible landing areas by means of a moon map. They will have to avoid mountains, treacherous craters and steep slopes which could cause their craft to fall over, for they would then be unable to take off.

The greatest "unknown" today is

the composition of the surface of the moon. Some scientists believe the moon is covered with dust several feet thick, while others claim it is a fragile, porous, slag-like structure. Still others think it consists of materials similar to earth rocks, because the moon may have been part of the earth, when both were in molten.

Mapmakers will continue to revise their lunar maps, adding more information as it becomes available, until the day when astronauts will blast off from earth and find out the facts from their own observations.

Worldwide Study of Harmful Insects Nears Completion

A 13-year worldwide survey on the geographic distribution and characteristics of harmful insects by Cornell University under contract with the U.S. Army Natick (Mass.) Laboratories is nearing completion.

Survey data filling more than 60,000 punch cards for future permanent reference will be the basis of a series of atlases, one for each continent, which are being funded by the U.S. Army Research Office (USARO). Maps and text will clarify for military planners concerned with safety and comfort of troops the geographical distribution of harmful and annoying insects.

The first atlas, on the continent of Africa, is expected to be completed by December 1965. Subsequent volumes on Asia and Latin America are being planned. Natick Laboratories scientists believe that nothing as ambitious as this comprehensive survey and series of atlases on insects and other species of arthropods has been previously achieved.

Dr. Hoyt Lemons, chief, Geophysical Sciences Branch, Environmental Sciences Division, USARO, arranged for the original contract with Cornell University in 1951 while associated with the Office of the Quartermaster General and conceived the idea of a series of atlases.

Carl Ross, Natick geographer in the Earth Sciences Division, has been the principal investigator of the survey. He explained its significance and the situation which demanded such comprehensive information:

"The presence of harmful insects and similar species of arthropods in most areas of the world remains an important problem to the military services and civilian populations, despite the development of more effective insect toxicants and improved methods of control.

"Not only are reports of insects acquiring resistance to antiinsect

preparations continuing, but also there is increasing concern about American personnel, assigned to less familiar areas of the world, being exposed to insect-borne diseases for which they have no natural immunity and for which no standard immunizations are available.

"There is increasing need for quickly obtainable, up-to-date information about the geographical distribution, seasonal incidence, habitats and disease relationships of insects and other arthropod species, especially for developing countries in Africa, Asia and Central and South America."

During the past year, listing of harmful insects and other species of arthropods in the U.S.S.R. was finished. Data from the world literature on these species were punched on cards and manuscript reports, summarizing the data, were prepared for each political subdivision.

Similar work was completed for Afghanistan, China, Iran, Iraq, Israel, Jordan, Lebanon, Muscat and Oman, Saudi Arabia, Syria, Turkey and Yemen.

In previous years, information was abstracted from the world literature on arthropods, recorded on punch cards, and summarized in country reports for Africa, North America, South America, Australia, Southeast Asia, and islands in the Indian and Pacific Oceans.

The worldwide survey has been extended to European countries, Greenland and Iceland and is scheduled for completion by the end of FY 1964.

Results will show what is known about the distribution, seasonal occurrence and other characteristics of disease vectors and annoying arthropod species throughout the world.

Findings may also serve as the basis for additional research by other Federal Government and civilian organizations in that they will indicate where more research, including field investigations, is required.

Lt Col Burke Named New CO Of Rocky Mountain Arsenal

Rocky Mountain Arsenal at Denver, Colo., has a new commander, Lt Col Martin Burke, Jr., who recently relieved Col Harvey E. Shepard, now assigned to Army Materiel Command Headquarters, Washington, D.C.

Graduated from the University of Georgia in 1942 with a bachelor's degree in chemistry, he was commissioned in the Armored Corps and served during World War II in the 14th Armored Division.

In 1948 he received a Regular Army commission in the Chemical Corps. Since then he has served in staff and command assignments, including a tour with the Joint Military Assistance Advisory Group in Cambodia.

He earned an M.A. degree in education from Michigan State University and has completed the Army Command and General Staff College.

Army Medical Personnel Study High Altitude Performance of Troops

Performance effectiveness of military personnel after rapid transfer to high altitude was studied recently by U.S. Army medical researchers during tests at Climax, Colo.

Staff members of the U.S. Army Medical Research and Nutrition Laboratory (USAMRNL) at Fitzsimons General Hospital, Denver, Colo., conducted the experiments. The Army Research Institute of Environmental Medicine (ARIEM) and U.S. Army Natick (Mass.) Laboratories participated in planning the tests and in initial studies at sea level.

Early in January personnel from USAMRNL selected and pretrained eight test subjects from Fort Carson, Colo., and six from Fort Devens, Mass. All were soldier volunteers from a combat field unit in the 18-25 age group, selected from those who showed the highest consistency of performance in pretesting.

Preparation for the period at Climax, altitude 11,400 feet, included a special exercising pattern of bicycling, walking, climbing stairs and using treadmills. Diets were controlled the final 10 days. After three weeks of testing at the high altitude, subjects were returned to Fort Carson and Fort Devens.

The Fort Carson men were pretested at Fitzsimons General Hospital in Denver, an altitude of about 5,200 feet, and the Massachusetts subjects were prepared at Fort Devens, a sea-level location. The Fort Devens men on Feb. 17 were flown by jet to Denver and both groups were transported to Climax by auto.

Tests began immediately. The standard diets and normal exercise patterns were continued in addition to special maximum performance tests and many



SATURATION of blood with oxygen in high-altitude studies was measured on individuals at Climax, Colo., site. From left, C. Frank Consolazio, LeRoy Matoush and Pvt Jaroslaw Metelnicki examine blood samples for comparison.

medical measurements. Included were basal metabolism, pulse and respiration, body water losses, food and liquid intake, and changes in blood chemistry and volume in lung gases. Tests were repeated frequently throughout the Climax study as acclimatization occurred.

Besides the study of humans, tests were conducted on animals which had been transported from sea level and mile-high altitudes to Climax's 11,400-foot elevation.

Four busloads of equipment and 100 animals were utilized by the Nutrition Laboratory researchers. Leader of the project was Lt Col James E. Hansen, chief of physiology, USAMRNL. Other principal investigators were C. Frank Consolazio, Dr. James A. Vogel, Dr. John P. Hannon and Kenneth S. K. Chinn.

Professional consultants from other institutions who gave valuable advice and support included:

Dr. Clark M. Blatties, Lt Col William H. Hall, M.C., and Robert F. Byrom, USARIEM; Capt Wayne O. Evans, USAMRL, Fort Knox, Ky.; Dr. Cutting Favour, National Jewish Hospital, Denver, Colo.; Dr. Giles Filley and Dr. Robert Grover, University of Colorado School of Medicine; Dr. Allan L. Forbes, Army Research Office and Lt Col Irvin C. Plough, Research and Development Command.

Few definite conclusions could be made after the initial study, research leaders reported. As this publication went to press, evaluation of the data had not been completed. Among preliminary impressions revealed by the investigators are:

- Altitude sickness symptoms were

more prominent in the group of volunteers brought quickly from sea level to 11,400 feet than in the group brought from 5,200 to 11,400 feet.

- Maximum performance, as measured by the bicycle ergometer, was reduced significantly and similarly in both groups. The reduction was less in staff members from 5,200 feet. A steadiness test (which correlates with rifle aiming skill) was not significantly changed in either group.

- On return to sea level, mean maximal performance, as measured by the bicycle ergometer, was significantly higher than initial sea-level values.

- The basal metabolic rate is approximately 5 percent higher at 11,400 feet than at sea level.

- In humans the reduction in food intake in abrupt movement to 11,400 feet was minimal and of doubtful statistical significance. Distribution of caloric intake between fat, carbohydrate and protein was unaltered from sea level or Denver values.

- Dogs did not run as well on the treadmill at 11,400 feet as they did before and after at 5,200 feet. They lost weight at high altitude and regained it upon return to Denver. Respiratory water loss was increased at high altitude.

The need for information on troop performance at high altitudes was summed up by investigators as follows:

"The combat effectiveness of the individual soldier, as generally agreed by expert civilian and military observers, would be seriously reduced during military operations at altitudes greater than 10,000 feet. There is notable lack of agreement, however,



As part of daily 2-hour work-out period, subjects finish running exercises prior to examination in high-altitude studies at Climax, Colo.

on the extent of this reduction, its underlying cause, its operational implications and the most practical means for its improvement.

"The limitations in our current knowledge and the need for information about human performance at high altitude were repeatedly stressed at two U.S. Army Research Office-sponsored conferences in March-April and September 1963."

The investigators noted that field commanders urgently need information on how much performance of troops will decrease at high altitudes, which capabilities will not be affected and how long it will take for acclimatization. Without this information, field commanders will not be able to estimate their personnel requirements and operational capabilities.

USAMRNL investigators plan another field study in August and September of this year with volunteers at sea level, 5,200 feet, 12,000 and 14,000 feet. They are looking into the possibility of using the summit of Pikes Peak for these and future studies. Pikes Peak's plateau is larger and is accessible longer, about six to seven months, than any other site over 14,000 feet in the United States.

Members of the project expressed appreciation to American Metal Climax Corp., which provided an empty school house, utilities and other services to reduce the cost of the project.

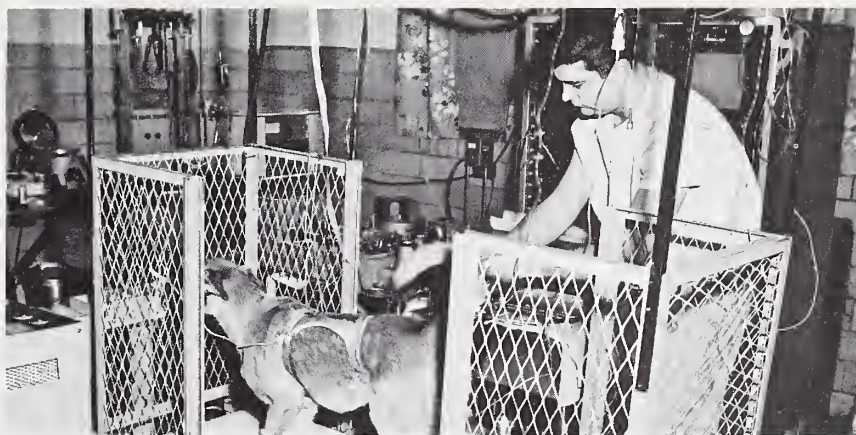
Panama R&D Office Renamed U.S. Army Tropic Test Center

The U.S. Army Research and Development Office, Panama, has been redesignated the U.S. Army Tropic Test Center.

No change was effected in the mission of the Center, an activity of the U.S. Army Test and Evaluation Command, a major subordinate command of the U.S. Army Materiel Command.

Activated in August 1962 and commanded by Col Robert T. Larson, the Center has provided an easily accessible research and testing area for many of the natural conditions of the hot, humid tropics. Headquarters at Fort Clayton and a Field Office at Fort Sherman are in the Canal Zone.

Attached to the Center are the U.S. Army Meteorological Team (RDT&E Support) and a U.S. Air Force Systems Command Scientific/Technical Liaison Office. A Special Operations Research Field Office functions as a contract agency monitored by the Office of the Chief of Research and Development and sponsored by the Deputy Chief of Staff for Military Operations and other Army agencies.



Dr. James A. Vogel, USAMRNL, records cardiovascular functioning of dog running on treadmill to measure work output during high-altitude tests.

Retiring WRGH Surgeon Given Legion of Merit

The Legion of Merit was awarded recently to Colonel Ernest A. Brav in ceremonies at Walter Reed General Hospital, Washington, D.C., marking his retirement from the Army.

Col Brav has been chief of the Orthopedic Service and consultant to The Surgeon General for Orthopedics at Walter Reed since 1962. Col Charles W. Metz, Jr., is his successor.

The accompanying citation states that Col Brav "distinguished himself by exceptionally meritorious service while serving in positions of responsibility from August 1956 to April 1964."

During this period, he served consecutively as chief, Orthopedic Service, 98th General Hospital; chief, Surgical Service, 97th General Hospital, U.S. Army Europe; chief, Orthopedic Service, Madigan General Hospital, Tacoma, Wash.

Brig Gen Henry S. Murphey, Walter Reed General Hospital commander, also presented Col Brav with Certificates of Appreciation and Retirement.

Educated in the public schools of his native Philadelphia, Col Brav earned his B.A. degree in 1924 and the M.D. in 1927 from the University of Pennsylvania and an M.S. in Orthopedic Surgery from the University of Minnesota in 1933.

A member of the American Board of Orthopedic Surgery, he also is affiliated with American Orthopedic Association, American Academy of Orthopedic Surgeons, Phi Beta Kappa, Sigma Xi and Alpha Omega Alpha honorary fraternities.

COL CHARLES W. METZ, Jr., the new chief of Walter Reed's Orthopedic Service, served as assistant chief of the service from 1959 to 1962. He spent the past two years in the Pan-

ama Canal Zone as chief of the Orthopedic Service at Gorgas Army Hospital.

A graduate of Vanderbilt University, Nashville, Tenn., where he earned his bachelor of arts degree in chemistry in 1941, he took his medical training at that University's School of Medicine and in 1944 received his M.D. The colonel also attended the University of Colorado (1937-1939).

A native of Denver, Colo., he entered military service in 1946, following completion of his internship at St. Luke's Hospital and his residency at Children's Hospital. His first assignment was at Fitzsimons General Hospital, Denver, Colo., as a resident, followed by a 3-year tour at the 98th General Hospital, Munich, Germany, from 1949-1952, where he served as assistant chief, Orthopedic Service.

Col Metz is a member of Phi Gamma Delta, the American Medical Association, Phi Chi, and the American Academy of Orthopedic Surgeons. Among his awards and decorations are the Army Commendation Medal.



Col Ernest A. Brav

Studies Seek Increased Body Tolerance

(Continued from page 19)

This subject is now known as pharmacogenetics and plays a significant role in understanding untoward effects produced by such drugs as aspirin, barbiturates, antimalarials, and the anti-tuberculosis agents. Genetically determined reactions to drugs in man are now recognized to be of major significance in many racial groups.

The recognition of the hazards of red blood cell destruction which follow the administration of a number of drugs was emphasized by the discovery of a biochemical, genetic basis for this effect. This individualistic serious reaction produced by the antimalarial drug, primaquine, was discovered in 1952 to be related to the character of the person's erythrocytes (red blood cells).

Subsequently, about 16 pharmacologically different drugs have been shown to produce erythrocyte destruction in therapeutic doses in persons with a biochemical genetic pattern that can be identified. The red cells of susceptible individuals have a reduced concentration of glutathione. More important is a deficiency in the cells' enzyme, glucose-6-phosphate dehydrogenase. Importance of this enzyme to the life of the red blood cell has been demonstrated, but the significance in terms of energy utilization by the cell is not entirely clear. The enzyme deficiency is apparently associated with at least 4 X-chromosome-linked mutations in man.

The blood cell trait is ubiquitous, but its incidence varies greatly in different racial and ethnic groups. It is likely that this enzyme deficiency is not limited to the erythrocytes. It has been demonstrated in other cells of the body of sensitive persons—blood platelets, leukocytes, liver, skin cells.

The interesting point has been made that this defect may actually provide a biological advantage in regions of the world where malaria is endemic. Regional distribution studies support such a view. It is likely that our bodies have developed modified enzyme systems that limit the effects of foreign chemicals that find their way into the body. This is essentially a protective process to rid the body of the multitude of undesirable chemical substances taken in with food or absorbed from man's environment. It has taken a long time for man to

recognize significance of these facts.

The provocative point that is raised by these discoveries is the ability of drugs to stimulate drug metabolizing enzymes paralleled *in vivo* by an accelerated rate of drug metabolism and by a shortened duration of drug action. Drugs are chemicals and if one can extrapolate these observations to chemical warfare agents, it may be possible to protect soldiers against CW agents that are metabolized in the body.

The prior administration of an innocuous chemical substance then could induce a tolerance for the poisonous agent. Unfortunately, the presently known CW agents are not detoxified by enzyme mechanisms in the liver. Still the basic principle may serve as a point of departure in developing enzymatic protection against toxic agents for other cells of the body.

We have demonstrated that it is possible to modify enzyme systems within the cells of the body by administering a drug or a chemical substance. This modification represents an adaptive mechanism on the part of the living cell. For many years we have known that it is possible to inhibit cellular enzyme activity; now we know that the total enzyme capacity of the body can be enhanced and poison destruction accelerated.

If this principle can be applied to all the living cells of the body, and presumably it can be, then it may be possible to open entirely new frontiers for drug action and chemical modification of living processes.

Through selective manipulation of the chemical structure that impinges on the cell, the controlling factors that modify the physico-chemical properties of the living cell can be regulated. Cellular life processes can be inhibited or enhanced, accelerated or slowed in a selective manner. In adapting these concepts to useful ends, we are but capitalizing upon natural evolutionary protective mechanisms.

Benefits that conceivably could accrue to the U.S. Army through greatly broadened knowledge in this relatively unexplored field of scientific research are clear. Results could greatly enhance the Army's capability for its mission of maintaining readiness worldwide for any emergency, in that combat troops could be prepared to cope with many strange and physiologically hostile environments, and possible enemy use of toxic weapons.



By Ralph G. H. Siu

Z-A-N-Z-I-B-A-R. It has been said among some "budgeteers" that some of the justification for R&D support do not sound as convincing as when they were first told years ago. In this connection, I am reminded of the following old folk tale about Zanzibar, told by Dr. T. K. Steele of Bulova.

And so we met outside the gates of Paris, and owing to the fact that I was a much better man than my adversary I defeated him. I then adjourned to a tavern. I said to a stranger, "I killed a man."

"Killed a man?" he asked, "Pray what was his name?"

I said, "Zanzibar."

"Sir," he explained, "he was my brother! We must have a duel."

And so we met outside the gates of Paris, and owing to the fact that I was a much better man than my adversary. . . (And so the tale repeats itself *ad infinitum*.)

THE EAGER-BEAVERS. Some of the fastest-stepping leaders of the packs of eager-beavers are the most interesting to observe. The sensation of the bystander resembles that of Alice with the Red Queen:

The most curious part of the thing was, that the trees and the other things round them never changed their places at all; however fast they went, they never seemed to pass anything.

"I wonder if all the things move along with us?" thought poor Alice.

And the Queen seemed to guess her thoughts, for she cried, "Faster! Don't try to talk!"

To which, the wise old observer may add Lao-tze's comment: He who is on the wrong path, the faster he runs the farther he is away from the truth.

CRISIS MAKERS. Some action officers have a propensity toward making BIG PRODUCTIONS out of what appear to be rather simple problems. Perhaps they may wish to consider the merits of George Bernard Shaw's admonition in *Cashel Byron's Profession*, Chapter 6:

"All this struggling and striving to make the world better is a great mistake; not because it isn't a good thing to improve the world if you know how to do it, but because striving and struggling is the worst way you could set about doing anything."

Armed Forces Pest Control Board Tours USDA Lab

One of the world's most modern biological research facilities, the U.S. Department of Agriculture's Insects Affecting Man and Animals Laboratory opened in 1963 in Gainesville, Fla., was the meeting place of the recent annual meeting of the Armed Forces Pest Control Board.

Lt Col Thurmond D. Boaz, Jr., chief, Special Projects Branch, U.S. Army Research Office, attended as one of the 11 Army members of the 65-member AFPCB. Delegates spent one entire day touring IAMAL's 75 individual laboratories and examining work being done to learn how to control harmful insects, largely without the use of chemicals.

Established prior to World War II, on a relatively small scale, the IAMAL is now responsible for providing research information on which the AFPCB may make decisions regarding the control of insects that affect performance of military personnel. The information concerns both materials and techniques.

IAMAL scientists develop experimental insect control measures ranging in scope from those applied on a small scale in individual buildings or local areas to measures applied for thousands of acres. Research is on both insecticides and repellents to protect humans and animals.

Research is intended primarily for the control of insects at public installations, in the case of the military such places as messhalls, barracks, latrines, recreation buildings and parade grounds. Experiments, however, often are conducted on the most convenient premises including poultry farms, dairy farms and private homes. Insect control techniques of interest to the military also may benefit public health agencies, home owners and farmers.

The Nation's annual loss of agricultural livestock to insects, it has been estimated, now averages more than a billion dollars. Many of the insects being studied are among the most common and annoying—mosquitoes, houseflies, lice, ticks, fleas, bedbugs and cockroaches which may carry organisms responsible for malaria, yellow fever, typhus and encephalitis, to name a few.

The IAMAL began functioning in 1942 as the Orlando Entomology Laboratory and was given responsibility of developing measures for control of and protection against insects of medical importance to the Armed Forces.

Scientists developed insecticides and repellents that minimized incidence

of insect-borne diseases among millions of troops and materials which stopped outbreaks of typhus in early stages.

Practices initiated at the Laboratory now enable a widespread epidemic of mosquito-borne malaria to be stopped within hours. Flies, which are potential transmitters of typhoid, cholera, dysenteries and other diseases, can be brought quickly under control, board members were told during the tour.

The 31,000-square-foot main building occupies about 12 acres on the campus of the University of Florida and offers an opportunity to recruit young scientists to serve in the fields of medical entomology, chemistry and biochemistry.

Forty individual laboratories are equipped with independent climate controls which keep humidity and temperature at any level required for research in progress. Equipment for radiological research is contained in a separate building.

Entomologist in charge of the Laboratory is Carroll N. Smith, who has been with the Insects Affecting Man

and Animals Branch of the Agricultural Research Service since 1931. Dr. Smith is a member of the Expert Panel on Insecticides of the World Health Organization at Geneva, Switzerland.

One of the newest fields of research at the Laboratory, and one which scientists there believe holds great promise, is chemosterilization. A chemosterilant is a chemical compound that causes sexual sterility in insects.

The Laboratory is placing heavy emphasis on investigation of chemicals or gamma radiation methods which will sterilize insects and ultimately force them to accomplish their own destruction.

Radiosterilization and release of laboratory-reared male insects have already eradicated the screw-worm fly in the southeastern United States, scientists at the Laboratory explained.

Entomologists and chemists at the facility are also continually formulating, screening and testing different compounds in search for insect repellents which will be more effective.

The ultimate objective is the development of an oral or systemic repellent a person may take, with complete safety, in pill form to prevent insect annoyance.

Aberdeen Holds 3-Service Technical Data Meet

Prominent Defense Department officials and senior officers from the Army, Navy and Air Force participated in a Technical Data Management Conference, May 5-7, Aberdeen Proving Ground, Md.

Keynote speeches on dealing with the complex and increasing technical information problem were made by two Assistant Secretaries of Defense,



Assistant Secretaries of Defense Dr. Eugene G. Fubini (left) and Thomas D. Morris get together for informal comparison of notes during recent Technical Data Management Conference at Aberdeen Proving Ground, Md.

Dr. Eugene G. Fubini (Deputy Director Research and Engineering) and the Honorable Thomas D. Morris (Installations and Logistics). Dr. Fubini spoke of his interest in technical data management and challenged discussion groups to find better ways of collecting and using available scientific information.

Secretary Morris told the 175 conferees that the DoD had a growing awareness of technical data importance at top management levels, saying: "Technical data management cost reduction would be the most pleasing of recommendations we can take to Secretary McNamara, and through him, to the President."

Senior officers participating in a panel on problems and progress in technical data management included General Bernard A. Shriever, commander, Air Force Systems Command; Maj Gen William Bunker, deputy commanding general, U.S. Army Materiel Command; Vice Adm William A. Schoech, chief of Naval Materiel; and Rear Adm Joseph M. Lyle, deputy director, Defense Supply Agency.

Maj Gen James W. Sutherland, Jr., commanding general, U.S. Army Test and Evaluation Command, welcomed delegates and offered his command's support during the conference.



FLARE

Eminent Scientists, R&D Leaders Contribute to Success of National JSHS

Nobel Prize scientist Dr. Polykarp Kusch, Assistant Secretary of the Army (R/D) Willis M. Hawkins and many of the Nation's top educational leaders made the Second National JSHS a stimulating and challenging experience for 140 science students.

JSHS is the acronym for the U.S. Army's Junior Science and Humanities Symposium Program. The gathering in Washington, D.C., under the auspices of the Chief of Research and Development, was the climax for the most gifted students chosen from among more than 4,000 throughout the United States. Selectees came from 20 regional conferences held throughout the year.

Tribute to the high caliber of the students and their achievements was voiced by a professor who conducted one of the several clinics to advise them regarding current significant trends in science and possibilities in scientific career fields. The appraisal was, "equal in ability to applicants recently interviewed in connection with the coveted Angier B. Duke Awards at Duke University."

In the impressive atmosphere of the Industrial College of the Armed Forces at historic Fort McNair, along the Potomac River, the students listened to an eloquent welcome from Maj Gen Philip C. Wehle, CG of the Military District of Washington. Col Theodore H. Erb followed with greetings on behalf of students of the Industrial College.

Speaking on "The Values and Limitations of Science in the Modern World," Dr. Kusch stated that science cannot yield "the good life" unless the products of technology are used with judgment and good taste, an acute



AT ARMY's NATIONAL JSHS held at Industrial College of the Armed Forces, Dr. Polykarp Kusch, Nobel Prize-winning physicist from Columbia University, responds to informal questions following his address on "Values and Limitations of Science in the Modern World," which greatly stimulated students.

knowledge of overall social needs, and with the knowledge that man, and not his machines, is the essence of a human civilization.

Mr. Hawkins sounded a stirring challenge to the students to fulfill the historic role of creativity associated with the imaginative power of young minds, uninhibited by the doubts that follow disappointments. He also gave a short exposition on the Army's need for and interest in highly qualified scientists, and particularly for imaginative researchers capable of bringing their ideas to fruition.

Director of Army Research Brig Gen Walter E. Lotz, Jr., amplified on Mr. Hawkins' theme when he spoke later on "Selection of a Career in Science" and stressed the value of the complete scientist, that is, the one whose interests are well-rounded—rooted in the humanities as well as science.

Dr. Samuel DeWitt Proctor, associate director, Office of Peace Corps Volunteers, discussed "Living in the Computer Age" and pointed out possibilities of how man should learn to use computers in solving many of the complex problems of modern life. Dr. William O. Baker, vice president for Research, Bell Telephone Laboratories, also discussed computers.

Dr. Ernst Weber, president of Polytechnic Institute of Brooklyn and chairman of the JSHS Advisory Council, played a prominent role in the symposium, and Chief of Research and Development Lt Gen William W. Dick, Jr., was present to state his interest in the JSHS Program. Other speakers and clinic leaders included

more than a dozen distinguished professors and educational leaders.

Students were generous in their applause of many speakers, but they clapped longest and loudest (several minutes of sustained acclaim) for Dr. Mason W. Gross, president of Rutgers State University, who gave the keynote address on the subject of humanities and the sciences. His theme: The well-rounded scientist must enrich his knowledge of himself and his relationship to the life around him, a knowledge of paramount importance in whatever field of endeavor he enters to stimulate creativity.

Students were taken on tours to the Smithsonian Institution, laboratories of the Walter Reed Army Institute of Research, the U.S. Army's Harry Diamond Laboratories and the National Bureau of Standards.

The symposium was conducted by the Army Research Office-Durham, N.C., with the cooperation of the U.S. Office of Education. The host organization was the Military District of Washington. Proceedings of the symposium will be issued in the near future.

UPMANSHIP. The Ziyarid Prince, Kai Kaus, *A Mirror for Princes*, Translated from the Persian by Reuben Levy (Dutton 1951), gave the following advice to his son in 1082:

When you set out to ride, never mount a horse that is too small. However handsome a man may be, he appears insignificant on a little horse. Although a man may be insignificant in stature, he appears to great advantage on a big horse.



Assistant Secretary of the Army (R&D) Willis Hawkins joins students at lunch during Second National JSHS.